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FM 5-135

DEPARTMENT OF THE ARMY FIELD MANUAL

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ENGINEER BATTALION

ARMORED, INFANTRY, AND INFANTRY (MECHANIZED) DIVISIONS

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HEADQUARTERS, DEPARTMENT OF THE ARMY

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HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D. C., 31 August 1973

**ENGINEER BATTALION, ARMORED, INFANTRY,
AND INFANTRY (MECHANIZED) DIVISIONS**

FM 5-135, 11 May 1970, is changed as follows:

Remove pages—	Insert pages—
i	i
1-1 and 1-2	1-1 and 1-2
2-1 through 2-3	2-1 through 2-5
3-1 through 3-4	3-1 through 3-4
5-1 and 5-2	5-1 through 5-2.1
7-1 through 7-4	7-1 through 7.4.1
9-1 through 9-7	9-1 through 9-9
10-1 and 10-2	10-1 and 10-2
10-5 and 10-6	10-5 and 10-6
Appendix E	

1. A star indicates new or changed material.
2. File this change sheet in front of the manual for reference purposes.

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FIELD MANUAL

No. 5-135

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 11 May 1970

ENGINEER BATTALION, ARMORED, INFANTRY, AND INFANTRY (MECHANIZED) DIVISIONS

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CHAPTER 1

INTRODUCTION

1-1. Purpose and Scope

a. This manual provides guidance for commanders, staff officers, and other personnel concerned with the employment of the divisional engineer battalions organic to the infantry, infantry (mechanized), and armored divisions (fig. 1-1, 1-2, and 1-3).

b. This manual covers the organization, missions, capabilities, and operations of the divisional engineer battalions and their components. Coverage is in sufficient detail to guide commanders and staffs in the accomplishment of the unit mission.

★*c.* The material presented herein is applicable to—

(1) General war, to include consideration of US employment of chemical and nuclear munitions; enemy employment of chemical, biological, and nuclear munitions; and operations in a chemical, biological, and radiological environment.

(2) Limited war.

(3) Cold war, to include stability operations.

(4) Operations in support of civil authorities, US or foreign.

★*d.* This manual is in consonance with the

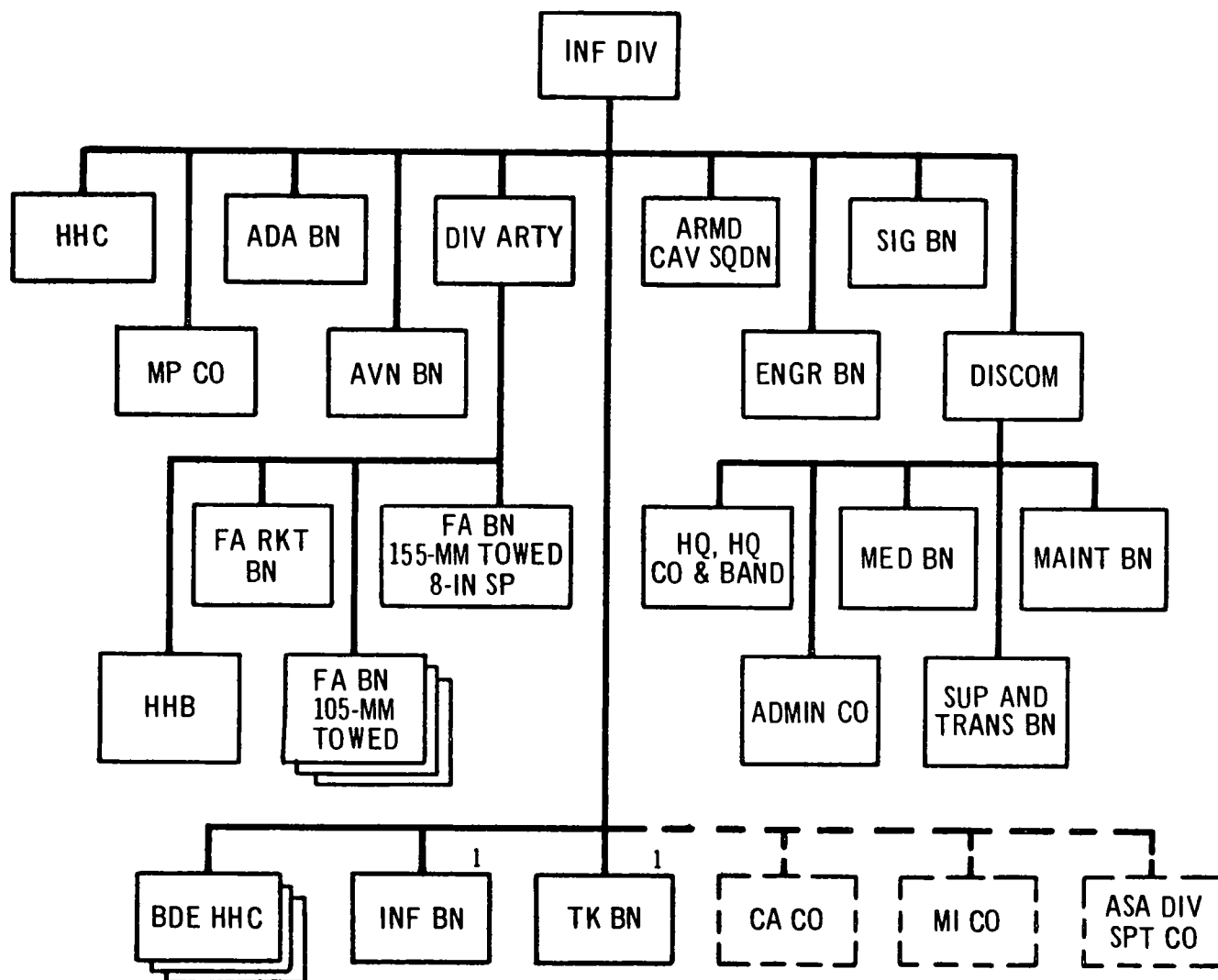
following International Standardization Agreements which are identified by type of agreement and number at the beginning of each appropriate chapter in the manual: Quadripartite Standardization Agreement—245, Minimum Requirements for Water Potability (Short and Long Term Use); and STANAG 2123, non-nuclear Demolition Target Folder.

★1-2. Comments

Users of this manual are encouraged to submit recommended changes and comments to improve the manual. Comments should be keyed to the specific page, paragraph, and line of text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications) and forwarded direct to the Commandant, US Army Engineer School, Fort Belvoir, Virginia 22060.

★1-3. Terms

The terms infantry (mechanized) division, mechanized division, and infantry division (mechanized) as used in this manual are synonymous and pertain to that division organized under TOE 37.



¹Number and type of battalions vary based on mission and operational environment.

LEGEND



Indicates normal attachment.

Figure 1-1. Infantry division.

CHAPTER 2

DIVISIONAL ENGINEER BATTALIONS

★2-1. Organization

a. The infantry division engineer battalion is organized under TOE 5-155. It consists of a headquarters and headquarters company, three engineer companies and a bridge company (fig. 2-1). Under augmentation, the battalion is authorized an additional engineer company to bring the engineer support for the division to full strength.

b. The armored and infantry (mechanized) division engineer battalions are identical and are organized under TOE 5-145 and each consists of a headquarters and headquarters company,

four engineer companies and a bridge company (fig. 2-2).

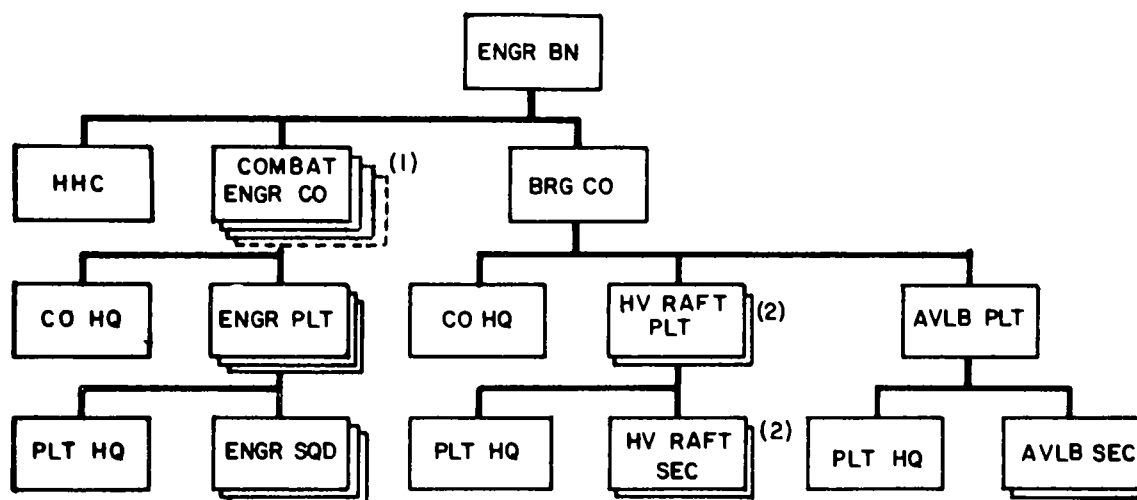
c. Unless otherwise stated, discussions in this manual pertain to all of the three types of divisional engineer battalions described in *a* and *b* above.

2-2. Mission

The mission of the division engineer battalion is to—

a. Increase the combat effectiveness of the division by means of engineer combat support.

b. Undertake and carry out an infantry combat mission when required.

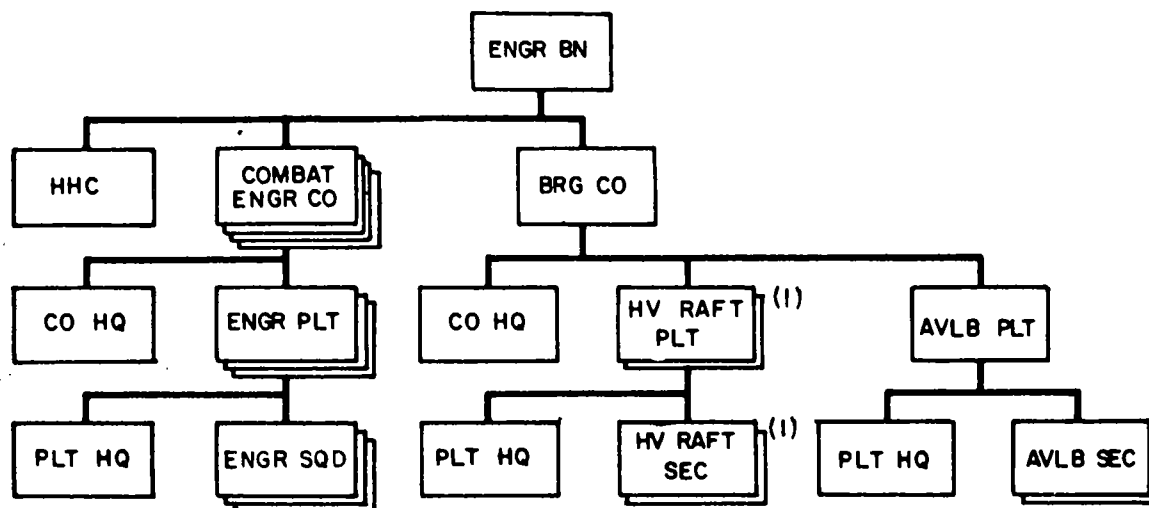


NOTES:

(1) Under augmentation, the engineer battalion, infantry division, is authorized an additional engineer company to bring the engineer support for the division to full strength.

(2) Titles changed to "Bridge Platoon" and "Bridge Section", respectively, when equipped with M4T6 or Class 60 bridging equipment.

★Figure 2-1. Organizational chart, engineer battalion, infantry division (equipped with MAB).



NOTE:

(1) Titles changed to "Bridge Platoon" and "Bridge Section", respectively, when equipped with M4T6 or Class 60 bridging equipment.

★Figure 2-2. Organizational chart, engineer battalions, armored and infantry (mechanized) divisions (equipped with MAB).

2-3. Capabilities

a. *Level 1.* At TOE level 1 this unit provides—

(1) Engineer staff planning and supervision for organic and attached engineer troops.

(2) Construction, repair and maintenance of roads, bridges, fords and culverts.

(3) Support of hasty stream crossing operations with boats, rafts, and bridges; coordination of organic and attached engineer troops in support of deliberate crossings.

(4) Fixed bridging for passage of short gaps.

★(5) Assistance in the emplacement of obstacles, including mines and boobytraps.

(6) Planning for, preparation and execution of firing of atomic demolition munitions (ADM). When required, this capability is increased by the attachment of TOE 5-570 cellular type ADM teams.

(7) Technical assistance to other troops in preparation of fortifications and camouflage.

★(8) Engineer reconnaissance and production of engineer intelligence.

(9) General construction works, including construction of landing strips.

(10) Construction and placement of deceptive devices and technical assistance in camouflage operations.

(11) Organizational maintenance of engineer, ordnance, and signal equipment organic to the battalion.

(12) Personnel and equipment for water purification and the supply of potable water.

(13) Technical advice to supported units on engineering matters, including recommendations for employment of engineer troops.

(14) Assistance in the assault of fortified positions.

(15) Locally available materials for construction.

(16) A unit to undertake and carry out an infantry combat mission, when required.

b. *Levels 2 and 3.* The levels 2 and 3 columns adapt the TOE for reduced operational capabilities in decrements of 10 percent, from approximately 90 percent for level 2 to 80 percent for level 3.

c. This unit is not adaptable to a type B organization.

2-4. Limitations

★*a.* Has a limited capability for earthmoving and requires equipment and personnel support for projects involving considerable earth-work.

b. When assigned an infantry combat role, requires fire support (mortars and artillery), forward observers, and time to reorganize for combat.

2-5. Allocation, Category and Mobility

a. Allocation. This unit is allocated on the basis of one per Infantry, Armored, or Infantry (Mechanized) Division.

b. Category. This unit is designated a category I unit.

c. Mobility. This unit is 100 percent mobile with organic transportation.

2-6. Equipment

The divisional engineer battalion is equipped with the weapons, construction equipment, hand-tools, power tools, bridging, and other equipment that will enable it to accomplish day-to-day engineer missions in support of the division. In situations where the battalion lacks the means to provide the engineer support required by the division, the next higher command echelon provides additional equipment or additional engineer units to accomplish the mission. The applicable TOE should be consulted to determine the amount and types of equipment authorized in the various units of the battalions. A theater commander or other major commander may authorize additions to or deletions from the equipment of organizations under his command; therefore, the unit equipment may vary between commands. Army aviation support for the engineer battalion may be provided by corps aviation units for armored and mechanized infantry divisions or by the aviation battalion of the infantry division. Engineer companies in a direct supporting mission receive army aviation support through the supported unit. Army aircraft may be provided upon request to airlift troops and equipment.

2-7. Employment

a. The engineer battalion is designed to provide engineer combat support in the forward portion of the battle area. It has the ability to overcome a great variety of obstacles to the movement of the division and hence contributes to

the mobility of the division and its capability to maneuver in offensive action. In defense, retrograde, or denial operations, it has the capability to materially impede the progress of enemy ground operations by blocking critical avenues of approach.

b. The combat engineer companies are placed in direct support of or attached to the brigade and combat elements of the division. The headquarters company has engineer construction equipment with operators to supplement the combat engineer companies for specific tasks. The bridge company provides stream and gap crossing equipment to enhance ground mobility.

★*c.* Combat engineer companies may be routinely associated with particular brigades so as to increase operational efficiency. The company commander serves as the engineer staff officer of the brigade.

d. When placed in direct support of a brigade, the combat engineer company gives priority to the supported brigade but operates under the control of the engineer battalion. It may be attached to a brigade for specific operations or when centralized battalion control is impracticable.

e. Engineer teams of less than platoon size normally are attached to combat elements. This is necessary when specific tasks require close command control. In the offensive, such tasks may consist of rafting, obstacle breaching, or trail cutting. In defense or retrograde, the installation of obstacles and the employment of ADM may require mission-type attachment.

★*f.* Engineer troops engage in limited combat incident to accomplishment of their normal missions. Early relief of engineer elements is made by other combat elements to permit continuation of engineer missions. The division commander will engage the engineer battalion in an infantry combat mission when the urgency of the situation so require their employment. Because of command and control problems inherent in performing relatively unfamiliar missions, the battalion should be committed as infantry as a unit.

g. When the armored cavalry squadron or task organizations are committed on separate missions, an appropriate engineer element is provided to the force. The supporting engineers should be mounted in vehicles similar in type to

those of the supported force to insure the same tactical mobility.

h. Special requirements for engineer effort should be considered when planning for airborne or airmobile operations. Engineer support may be required at loading areas and access routes thereto. The extent of engineer effort that is or will be required at landing/drop zones also must be considered so that sufficient engineers and engineers and engineer equipment are provided.

★*i.* When the requirement for engineer support within the division exceeds the capability of the divisional engineer battalion, additional engineer support is provided by nondivisional engineer units of corps or army.

(1) The additional engineer support to the division may range from reinforcement of the combat engineer strength to the provision of such support as bridging, road construction, debris removal, erection of barriers, mapping and other engineer intelligence, survey, camouflage, and deception.

(2) Normally, one engineer combat group from corps in a corps general support role is providing additional engineer combat support for two divisions. These general support engineers work in the division area on a task (mission) basis, an area basis or a combination of both task and area assignment. Tasks or missions may include those listed in (1) above. If corps GS engineers are required in the division area to relieve the divisional engineer of certain general support type tasks to allow the divisional battalion to place its priority to the forward forces in contact, a forward working limit (FWL) is negotiated. The FWL is an engineer control measure mutually agreed upon by the division engineer and the corps engineer or his representative, usually the group commander in the division zone. When nondivisional engineers are working in the division area on either a task or area assignment, corps has the responsibility of providing liaison to the division. This liaison normally locates in the TOC or G-3 office with the ADE and serves to inform the division en-

gineer of the status of engineer work undertaken by the nondivisional engineers and to receive special requirements and additional information from the division engineer.

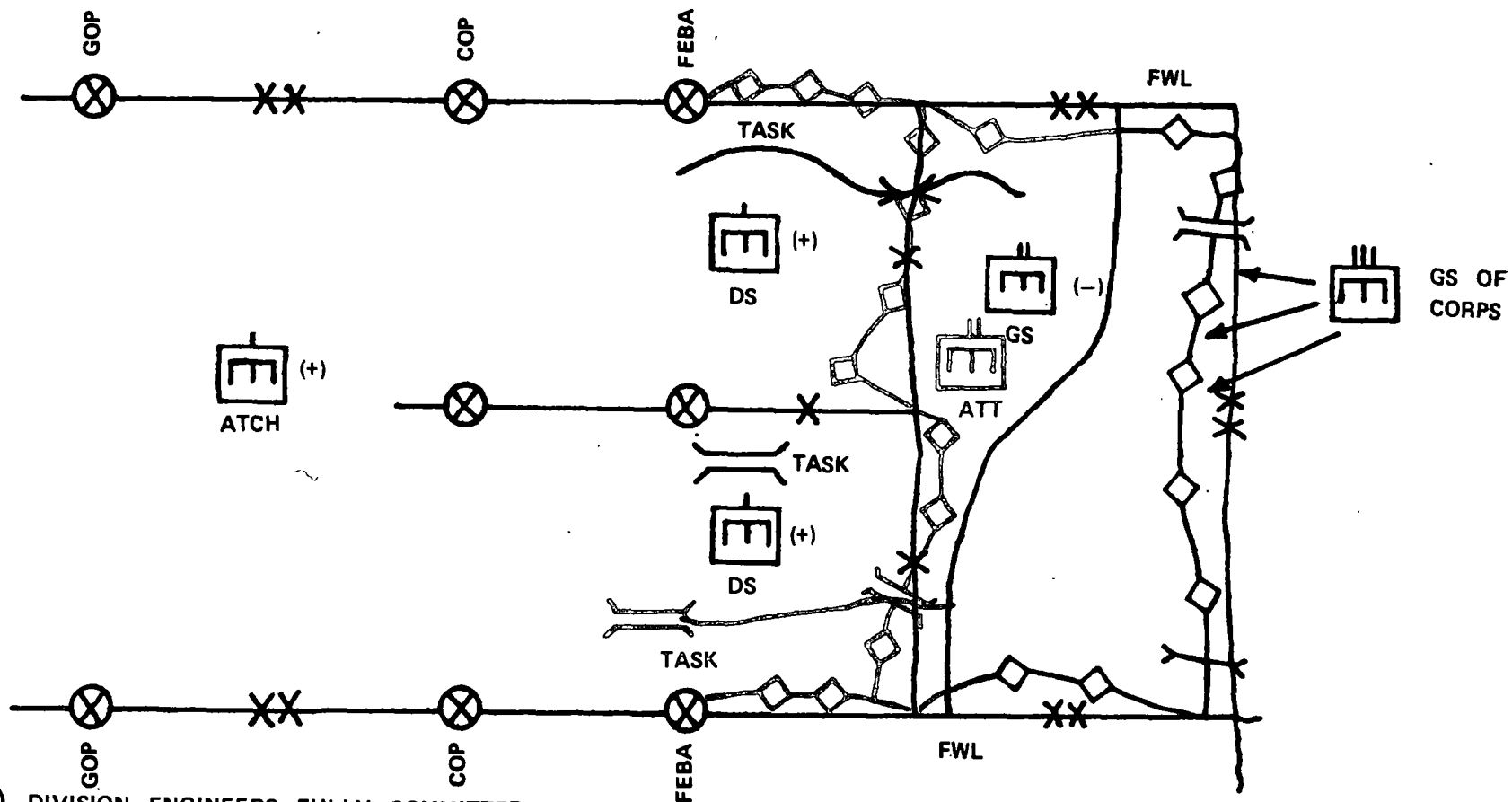
(3) Nondivisional engineer units may be placed in direct support of or attached to a division. Attachment allows maximum latitude for the division commander whereas the support relationship of direct support lacks inherent flexibility. DS corps engineer units may be used on either a task or area assignment but a forward working limit is not established for them. The FWL only applies to GS corps engineers. A situation might arise where the division might have the organic engineer battalion, GS nondivisional engineers working up to a forward working limit with tasks forward of this limit and a nondivisional engineer battalion attached (fig. 2-3).

(4) In all cases the coordination of all engineer work within the division area is the responsibility of the division engineer.

★*j.* When nondivisional engineer units are placed in direct support or general support of a division, combat service support normally is provided by the parent unit through corps channels. However, details of combat service support for the supporting engineer unit should be jointly reviewed and discussed by the responsible officers of both the division engineer battalion and the supporting nondivisional engineer unit.

★*k.* When nondivisional engineer units are attached to a division, all combat service support normally is provided by and through division channels. However, the order of attachment may except certain combat service support such as supply and maintenance. In this case, the supply and maintenance support are provided through corps channels. In all cases, the order of attachment should be formally reviewed and discussed by the responsible officers of the division engineer battalion and those of the attached engineer unit so that misunderstandings on combat service support and other matters can be avoided.

★ Figure 2-8. Divisional and nondivisional engineers in support of a division.



- ① DIVISION ENGINEERS FULLY COMMITTED.
- ② FORWARD WORKING LIMIT (FWL) FOR CORPS GENERAL SUPPORT (GS) ENGINEERS (INCLUDES BARRIER RESPONSIBILITIES).
- ③ TASKS (BRIDGE AND ROAD MAINTENANCE) FORWARD OF FWL FOR CORPS GS ENGINEERS.
- ④ TASKS FOR NON DIVISIONAL ENGINEER BATTALION ATTACHED TO DIVISION (BARRIER CONSTRUCTION, RESERVED DEMOLITION AND ROAD MAINTENANCE).



CHAPTER 3

HEADQUARTERS AND HEADQUARTERS COMPANY

3-1. Organization

Headquarters and headquarters company of the infantry divisional engineer battalion is organized under TOE 5-156; that of the armored and mechanized infantry divisional engineer battalions under TOE 5-146. The three units are similarly organized (fig. 3-1) and each consists of two elements; a battalion headquarters and a headquarters company.

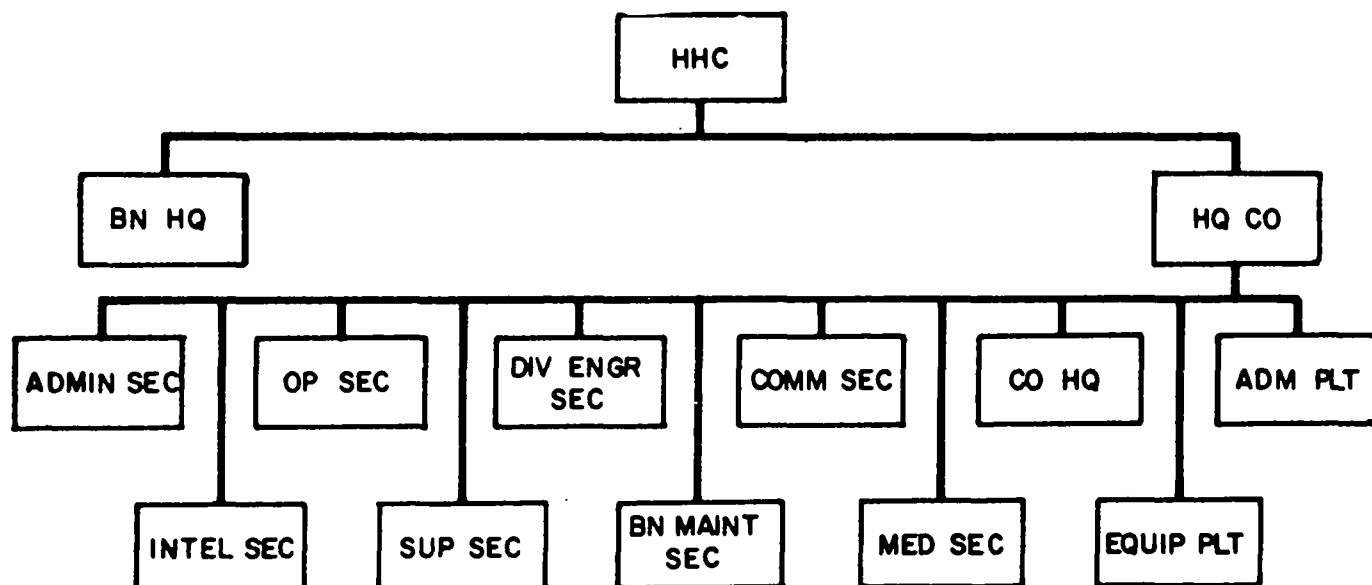
★*a. Battalion Headquarters.* The battalion headquarters consists of:

- (1) Battalion commander (also division engineer).
- (2) Executive officer.
- (3) Assistant division engineer (ADE).
- (4) S1.
- (5) S2.

- (6) S3.
- (7) S4.
- (8) Engineer equipment officer.
- (9) Chaplain.
- (10) Communications-electronics officer.
- (11) Command sergeant major.

b. Headquarters Company. Headquarters company consists of a company headquarters, an equipment platoon, an ADM platoon, and the personnel of the following battalion headquarters sections:

- (1) Administration.
- (2) Operations.
- (3) Intelligence.
- (4) Supply.
- (5) Division engineer.



NOTE: This chart portrays the source and distribution of personnel in headquarters and headquarters company. It is not a chain of command chart.

★Figure 3-1. Headquarters and headquarters company, divisional engineer battalion.

- (6) Communications.
- (7) Maintenance.
- (8) Medical.

3-2. Mission

The mission of headquarters and headquarters company is to:

a. Provide an engineer special section for the division and to provide command and staff for the divisional engineer combat battalion.

b. Provide administration, operations, control, communications, reconnaissance and engineer intelligence, supply, organizational maintenance support, supplemental engineer and ordnance construction equipment, and medical services for the battalion. To provide for the production and supply of potable water for the division and for combat support by the planning, preparation for employment, and firing of atomic demolition munitions (ADM).

c. Carry out infantry combat missions when required.

3-3. Capabilities

a. Level 1. At TOE level 1 this unit provides:

(1) Staff planning of division engineer operations and supervision of organic and attached engineer troops.

(2) Potable water for the division through the operation of up to five water points.

(3) Engineer reconnaissance and intelligence for the engineer battalion and the division.

(4) Limited ADM support to the division. This capability may be increased by the attachment of TOE 5-570 ADM teams.

(5) Unit level medical service for the battalion, to include medical care and evacuation, establishment of a battalion aid station, and furnishing aid men to companies.

(6) Supplemental construction equipment and operators to elements of the battalion.

(7) Organizational maintenance for battalion equipment.

(8) Radio and wire communications for the battalion.

b. Individuals of this company, except medical personnel and the chaplain, can fight as infantrymen when required. The company has the capa-

bility of defending itself and its installations against hostile ground attack.

c. When the battalion is committed to a combat role, headquarters and headquarters company functions as an infantry, infantry (mechanized) or armored infantry battalion headquarters (chap 8).

d. Levels 2 and 3. The levels 2 and 3 columns adapt the TOE for reduced operational capabilities in decrements of 10 percent, from approximately 90 percent for level 2 and 80 percent for level 3.

3-4. Allocation, Category and Mobility

a. Allocation. This unit is allocated on the basis of one per divisional engineer battalion.

b. Category. This unit is designated a category I unit, (AR 310-25).

c. Mobility. This unit is 100 percent mobile in organic transportation.

3-5. Equipment

Major items of equipment in headquarters and headquarters company include:

a. Truck mounted, 1,500 gph, water purification sets.

b. 20T, 3/4 cu yd, crane shovels.

c. Graders.

d. Tractor dozers.

e. Pneumatic tool and compressor outfit.

f. 5-T dump trucks.

g. 2 1/2- and 3/4-T cargo trucks.

h. Generator sets, 1.5 to 10KW.

3-6. Operation

The battalion commander organizes and locates his headquarters in a manner best suited for carrying out his staff and command functions.

a. Location. In addition to other considerations, the headquarters is located to facilitate communication with the division command post, subordinate units, the support, command, and other supporting engineer units. The situation or the disposition of the division dictates the organization and operation of the headquarters in one, two, or three echelons. Fragmentation of the

headquarters to the extent of impairing effective operation is avoided.

★*b. Echelons.* Figures 3-2 and 3-3 depict a suggested organization and location of headquarters for operations in two and three echelons respectively. The battalion commander may organize his headquarters in two echelons when frequent moves are anticipated, to achieve dispersion, to improve communications and control, or to stay in close touch with an operation such

as a river crossing. In any of these situations, the commander retains in the forward echelon the staff officers and other personnel required to assist him in fulfilling his command and staff responsibilities. In a fast moving situation, the battalion commander may be operating with the division commander and his command group in the division tactical command post. In such a situation, he may organize the entire headquarters into three echelons to facilitate control and movement.

ENGR BN, FORWARD	ENGR BN, REAR
BN CO BN XO ADE(at Div Main CP) S1 S2 RECON OFFICERS S3 & ASST S3 C-E OFFICER CHAPLAIN HQ Co CO ADM PLT LEADER COMD SGM CML STAFF NCO	S4(Responsibility for operation of BN, REAR) ENGR EQUIP OFFICER ENGR EQUIP REPAIR TECHNICIAN HQ Co XO LIAISON OFFICER EQUIP PLT LEADER COMM NCO
NOTE: Battalion forward is located near division main. Battalion rear is generally located near support command. All personnel and equipment not needed for the operation of the forward echelon remain with rear echelon.	

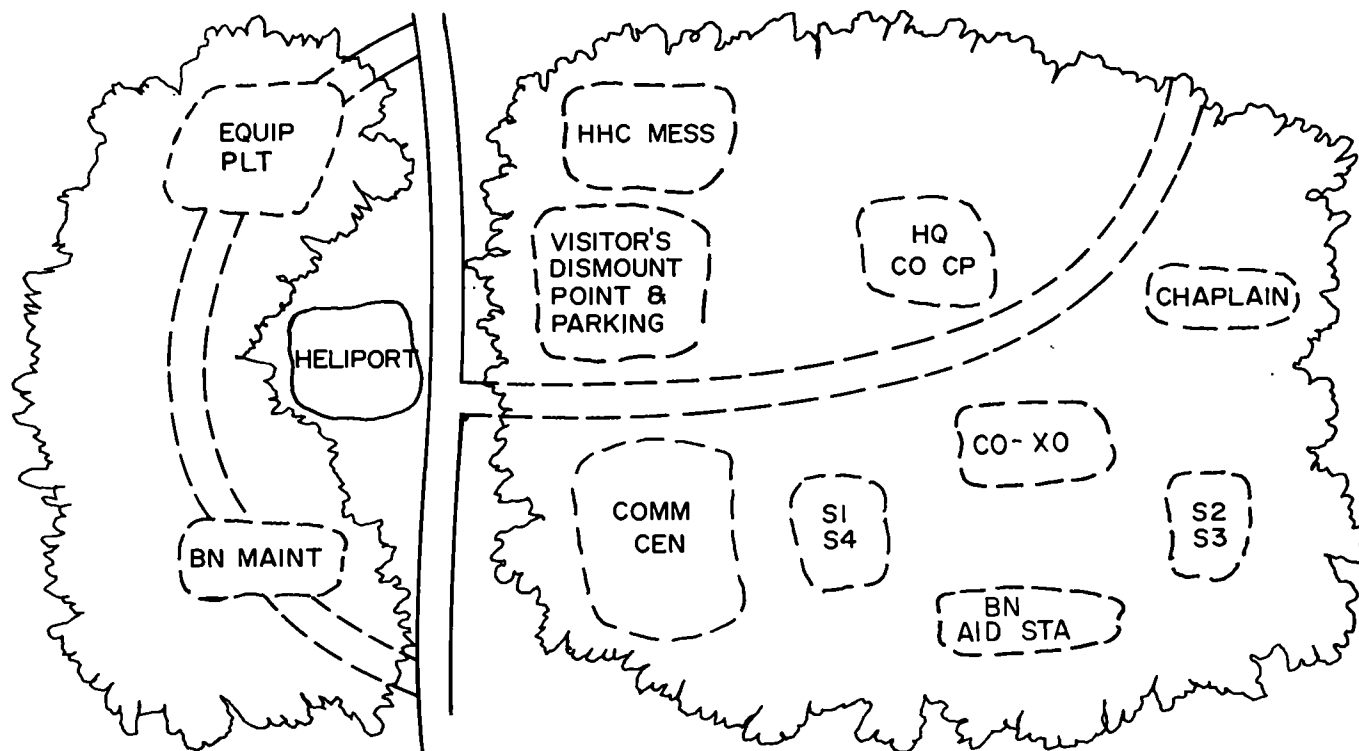
★Figure 3-2. Organization of battalion headquarters in two echelons.

ENGR BN COMD GP	ENGR BN, FORWARD	ENGR BN, REAR
BN CO S2 S3 RECON OFFICERS C-E OFFICER	BN XO ADE(at Div Main CP) S1 ASST S3 CHAPLAIN HQ Co CO ADM PLAT LEADER COMD SGM CML STAFF NCO COMM NCO	S4 ENGR EQUIP OFFICER ENGR EQUIP REPAIR TECHNICIAN HQ Co XO LIAISON OFFICER EQUIP PLT LEADER

★Figure 3-3. Organization of battalion headquarters in three echelons.

★*c. Layout.* The battalion command post (CP) is laid out to facilitate security, dispersion, communications, concealment, movement to and from the area, and movement within the area. Figure 3-4 illustrates a layout when the CP is in one echelon.

★*d. Assistant Division Engineer.* The assistant division engineer (ADE) is located in the tactical operations center (TOC) at the division main command post.



★*Figure 3-4. Battalion command post layout—one echelon.*

CHAPTER 5

BRIDGE COMPANY

5-1. Organization

The bridge company of the divisional engineer battalion is organized under TOE 5-148 and is the same for the armored, mechanized, and infantry divisions. It consists of a company headquarters, an armored vehicle launched bridge (AVLB) platoon, and either two identical heavy raft platoons (mobile floating assault bridge/ferry equipment (MAB) or two identical bridge platoons (M4T6 or Class 60 Bridging) (fig. 2-1).

5-2. Mission

The mission of the bridge company of the divisional engineer battalion is to—

a. Provide technical personnel and equipment to load, transport, erect, operate, maintain and disassemble tactical assault stream crossing equipment.

b. Accomplish nontactical independent bridging or ferry missions as required.

5-3. Capabilities

★a. *Level 1.* At TOE level 1 this unit provides—

(1) When equipped with mobile floating assault bridge heavy equipment (fig. 5-1 and 5-2):

(a) One 472 foot (144 meter) Class 60 floating bridge or;

(b) Two 262 foot (80 meter) Class 60 floating bridges or;

(c) Four 157 foot (48 meter) Class 60 ferries.

(2) When equipped with the M4T6 or class 60 bridging equipment: (fig. 5-3 and 5-4):

(a) Erection of up to 560 ft (170.7 meters) of class 50 M4T6 floating bridge or eight class 50 rafts.

(b) Erection of up to 540 ft (164.6 meters) of class 60 floating bridge; or 4 four-float (reinforced) rafts; or 4 five-float rafts; or a combination of bridge and rafts.

(c) Bridge components may be used to

assemble fixed spans from 15 to 45 feet long without intermediate supports. Fixed spans over 45 feet long can be assembled using trestles or piers as intermediate supports. For details see chapter 10 of TM 5-210.

(3) Armored vehicle launched bridging equipment capable of passing class 60 loads over wet or dry gaps up to 60 ft (18.3 meters) wide at four simultaneous assault crossings (fig. 5-5).

(4) Light stream-crossing equipage to support an infantry battalion in a river crossing when amphibious vehicles cannot be used, are not available, or river conditions preclude the use of mobile amphibious bridge or ferry vehicles. Equipment includes—

(a) Pneumatic assault boats (18 each) and pneumatic reconnaissance boats (12 each) to carry one infantry company by waterborne assault.

(b) Light tactical bridge equipage with the following options (fig. 5-6):

1. Two class 12 ferries, or

2. One class 12 bridge 103 ft (31.4 meters) long, or

3. Eight pontons powered by outboard motors to be used as storm boats for assault crossings of infantry companies.

(5) Effective coordinated defense of the unit's area or installation.

(6) Organizational maintenance for organic vehicles and engineer equipment.

b. *Levels 2 and 3.* The level 2 and 3 columns adapt the TOE for reduced operational capabilities in decrements of 10 percent, from approximately 90 percent for level 2 to 80 percent for level 3. At level 3 the armored vehicle launched bridging capability is reduced to two sites and the light tactical bridge equipage is deleted.

5-4. Limitations

This unit is dependent upon the battalion headquarters company for medical support. This unit is not adaptable to a type B organization.

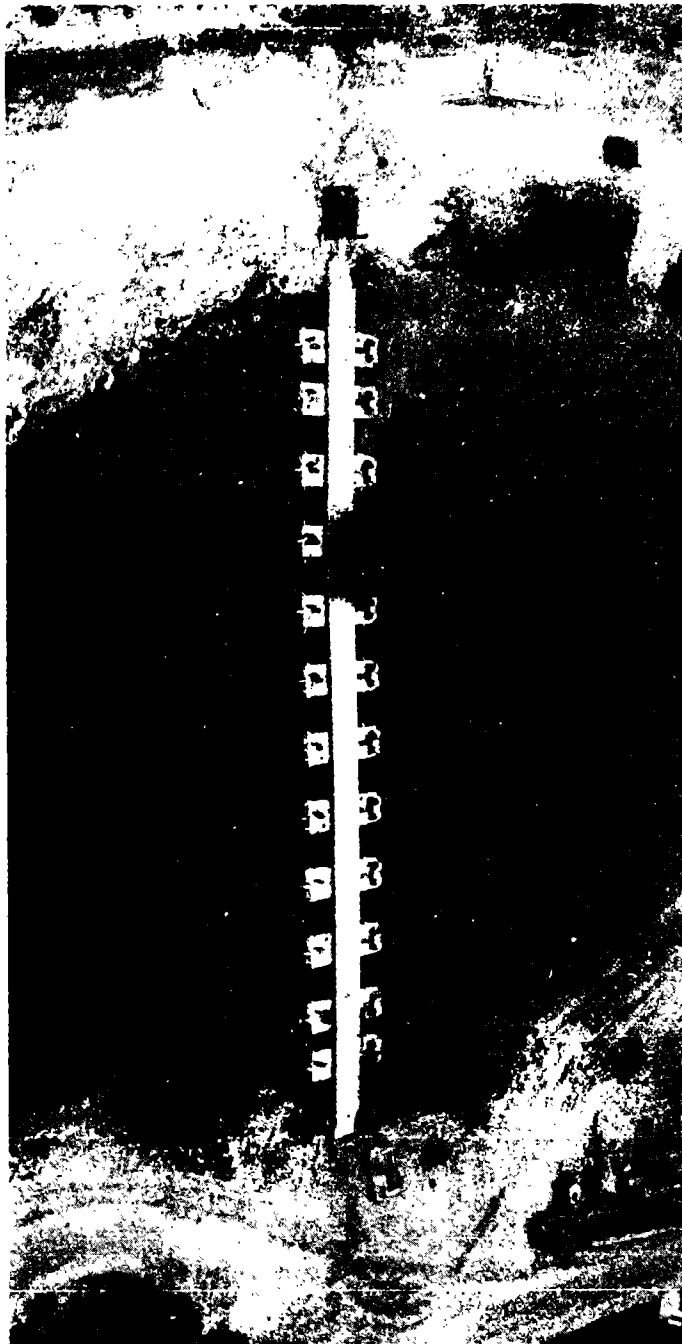


Figure 5-1. Mobile floating assault bridge-ferry (MAB).

5-5. Allocation, Category and Mobility

a. Allocation. This unit is allocated on the basis of one per engineer battalion, armored division or infantry division (mechanized) TOE 5-145; or one per engineer battalion, infantry division, TOE 5-155.

b. Category. This unit is designated a category I unit (AR 310-25).

c. Mobility. This unit is 100 percent mobile in organic transportation.

5-6. Equipment

The bridge company contains the major items of equipment listed below:

a. Mobile floating assault bridge/ferry, or floating bridge, M4T6, or floating bridge, class 60.

b. Armored vehicle launched bridges and launchers.

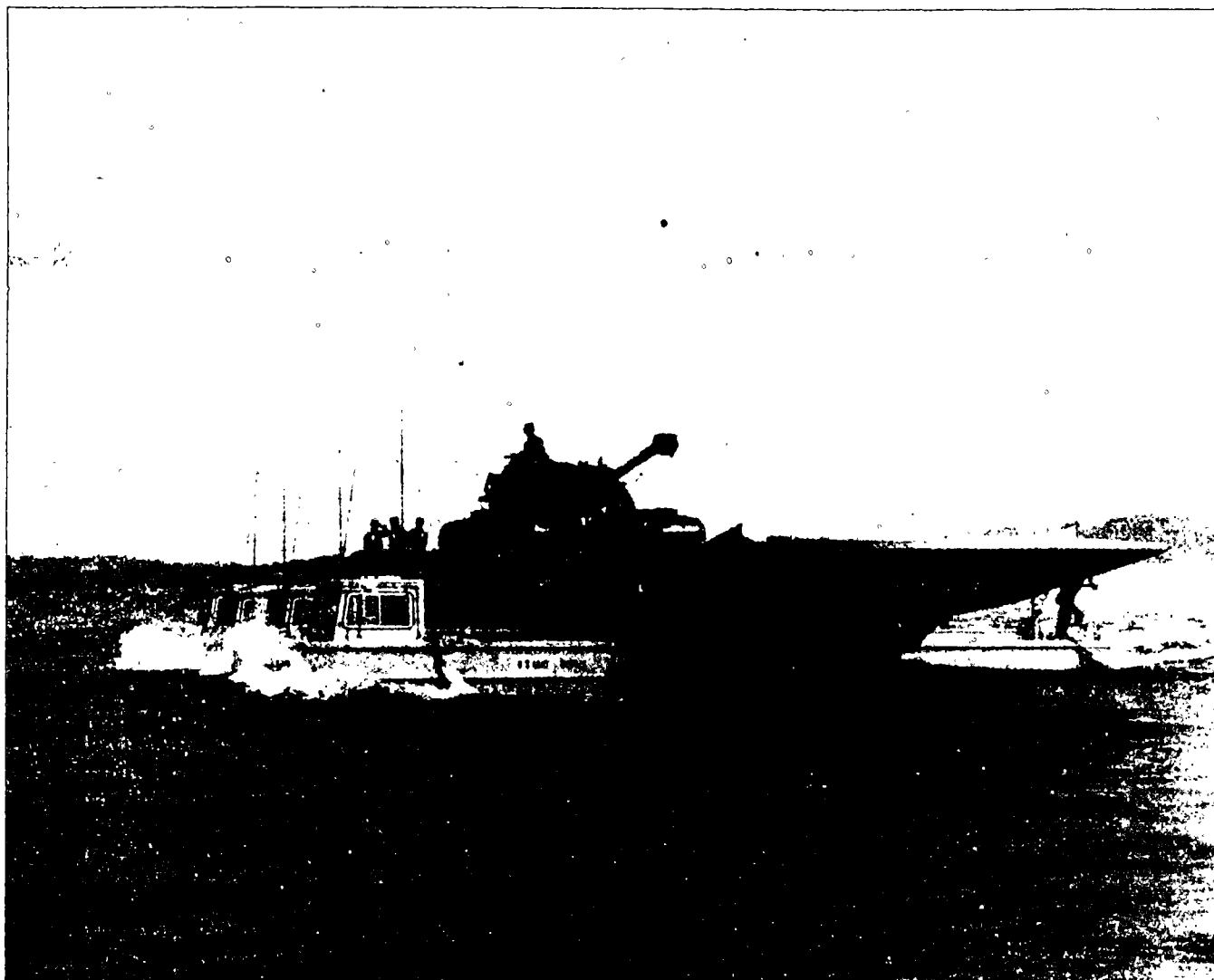


Figure 5-2. Load Class 60, MAB ferry.



CHAPTER 7

DEFENSIVE OPERATIONS

STANAG 2123

Section I. INTRODUCTION

7-1. Purpose and Forms of Defense

a. Purpose. Defensive operations are actions to prevent, resist, repulse, or destroy an enemy attack. The defense is undertaken to develop more favorable conditions for subsequent offensive operations, economize forces in one area in order to apply decisive force elsewhere, destroy or trap a hostile force, deny an enemy entrance to an area, or reduce enemy capability with minimum losses to friendly forces. The fundamental forms of defense are the mobile defense and the area defense. Generally, neither type is used in its pure form when conducting defensive operations. More often the most suitable form of defense for a given situation will be some variation of either the mobile or area defense, incorporating elements of each. The defense established is that which best meets the requirements of the particular situation.

★*b. Mobile Defense.* The mobile defense is that form of defense in which minimum forces are deployed forward and priority is given to use of mobile combat elements and fires concentrated in the reserve. Primary reliance is placed on the use of offensive action by the reserve to destroy enemy forces. In the mobile defense, the defender plans to accept decisive engagement and to accomplish his mission primarily by executing offensive action against the attacking enemy forces. Control of the forward defense area and the retention of terrain are not primary objectives of the counterattack. The fixing forces, those minimum necessary forces committed initially in the forward defense area, conduct defensive, delaying, screening, or limited offensive operations in any combination required in order to make the attacker vulnerable to the counterattack. Mobility equal or superior to that of the enemy is essential for all elements of the defensive force. Figure 7-1 depicts a typical dis-

position of a divisional engineer battalion in a mobile defense. Normally, the engineer company supporting the mobile reserve force is reinforced. This is in line with the principles of the mobile defense which require a light fixing force in the forward defense area and the concentration of combat power in the reserve force for counterattacking. Accordingly, the reinforced engineer company which supports the reserve force may have a variety of equipment and additional personnel attached, depending on the mission, enemy, terrain and weather, and the troops available (METT). For examples, additional scoop loaders, tractors, and CEVs may be required to clear rubble and debris in built up areas or additional AVLBs may be required to span short gaps in the path of the counterattacking reserve force. The engineer support to the GOP is the first divisional engineer battalion priority and may range from a platoon to a reinforced company or perhaps an engineer task force. The engineer support to the brigades in the forward defensive area should be minimal but consistent with engineer work requirements and should normally not exceed a company per brigade (para 7-2).

★*c. Area Defense.* The area defense is that form of defense in which emphasis is placed on retention of or control over specific terrain. Reliance is placed on the ability of fires and forces deployed on position in the forward defense area to stop and repulse the attacker. The forward defense area has a higher priority for combat power than does the reserve. In the area defense, the defender plans to accept decisive engagement and to accomplish his mission primarily by engaging the attacker along the forward edge of the battle area with a large volume and variety of fires. Counterattacks are conducted primarily to eject or destroy enemy forces that penetrate the position and to regain control of the forward defense area and terrain which the de-

fense has been designated to retain. Figure 7-2 depicts a typical disposition of a divisional engineer battalion in an area defense. Normally, one engineer company supports each of the committed brigades in the forward defense area. Depending on METT, these engineer companies may be reinforced. Priority of the engineer support in the forward defense area is given to organization of the ground. Engineers advise, and where required, actively assist the tactical units in preparing defense positions, counter-attack routes, routes for supply and, where time permits, strengthening defensive positions. Engineer support to the GOP is, again, the division engineer's first priority and may vary in unit size. The reserve is not allocated engineer support in an area defense until committed to eject enemy penetrations (para 7-2).

7-2. Disposition of Engineer Support

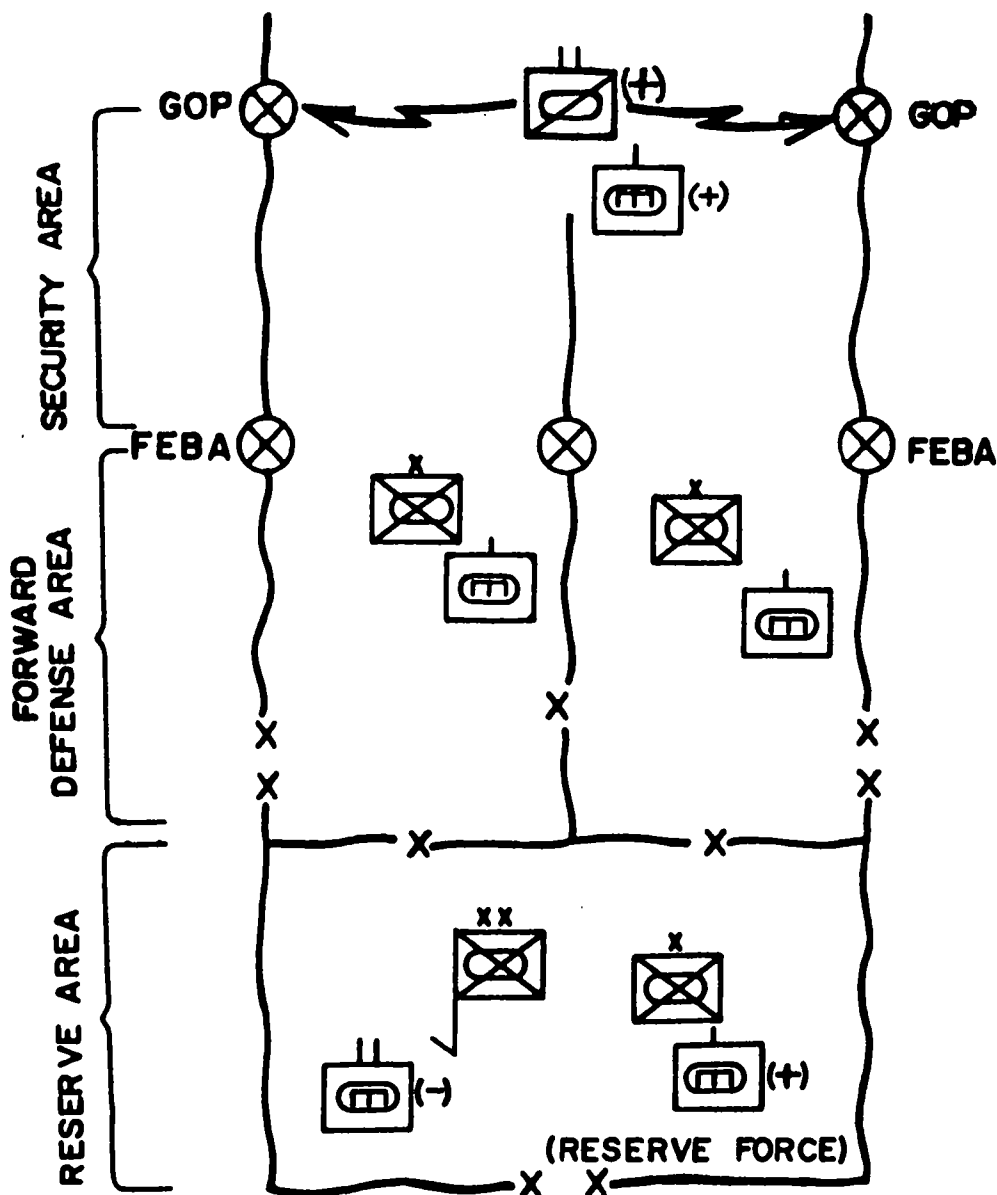
Defensive areas include the security area, the forward defense area, and the reserve area.

a. Security Area. The division security area begins at the forward edge of the battle area (FEBA) and extends as far to the front and the flanks as security elements are employed. Forces in the security area furnish information on the enemy; delay, deceive, and disrupt him as much as possible; and provide a counterreconnaissance screen. They also may have the mission of locating and developing nuclear targets. Forces operating in the security area may include elements from echelons higher than division, such as a corps covering force and units to provide aerial surveillance and flank security. Division forces in the security area will consist of the general outpost (GOP), combat outposts, flank security forces, division aerial surveillance elements, and patrols. There is no prescribed organization for the general outpost or covering force. The GOP may be a brigade or elements thereof, a reinforced armored cavalry squadron, or a battalion task force as required. An engineer unit normally is attached to the GOP force. The engineer unit commander advises the general outpost or covering force commander on engineer work and assigns missions and areas of responsibility to his subordinate units. Each unit with an area assignment is responsible for keeping open the main withdrawal route within its area and preparing the obstacles along that route. Each unit is also responsible for preparation and execution of obstacles on the lateral roads within its respective area. On the combat outpost (COP), engi-

neers have generally the same mission as in the GOP, though on a smaller scale. Engineer tasks would generally include preparation and execution of conventional demolitions and atomic demolition munitions; preparation of obstacles; and pioneer construction tasks.

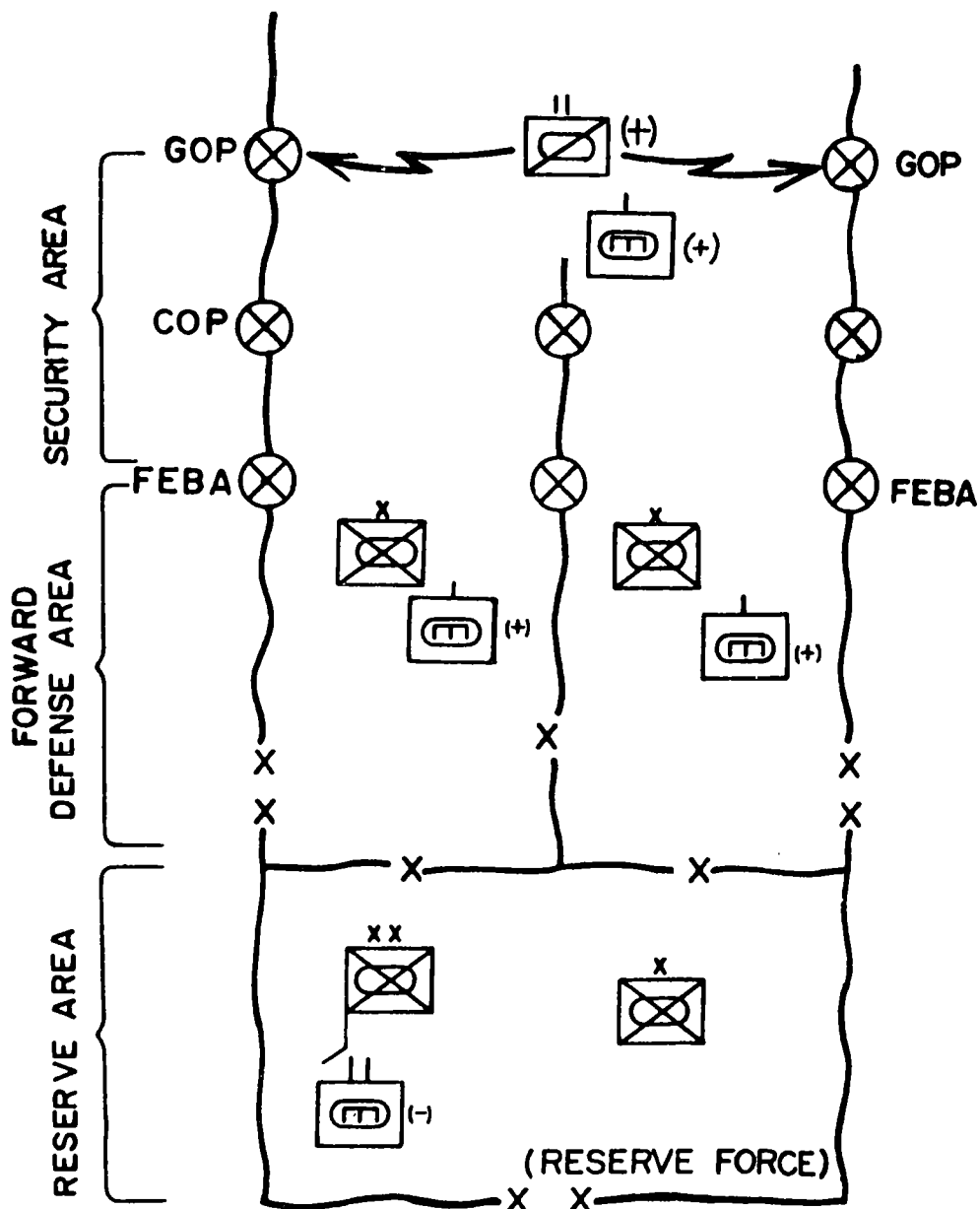
b. Forward Defense Area. The forward defense area extends rearward from the FEBA to include that area organized by the forward committed units. The composition of forces in the forward area depends on the form of defense employed, but there is usually one engineer company in direct support of each committed brigade. The remaining engineer companies are in general support of the division and have a secondary mission of supporting other task forces on order. In the mobile defense, the fixing force commanders organize their areas by establishing defensive positions augmented by observation and listening posts and patrols. The positions are areas organized for all-round defense by elements varying in size from a company to a battalion task force. They are located to control terrain that dominates avenues of approach and to repel, delay, and canalize attacking forces. Alternate or successive positions are designated in depth. Because of the limited forces in the forward area, these positions cannot be initially occupied in depth. The forward defense force is allocated the minimum essential forces to carry out its mission. It normally is infantry heavy. In the area defense, the forward defense area is organized into defensive positions which provide good fields of fire, observation, and natural defensive strength. Positions are prepared to block avenues of approach at the FEBA and in depth to control the area. The natural defensive strength of the terrain is increased as time permits by the use of artificial obstacles, fortifications, and barriers. For NATO forces nonnuclear demolition target folders should be prepared in accordance with STANAG 2123.

c. Reserve Area. The reserve area extends rearward from the forward defense area to the division rear boundary. The reserve echelon mans the reserve area, consists of those uncommitted forces held under division control, and is the principal means by which the commander influences the defensive battle and regains the initiative. The combat power of the reserve may consist of nuclear weapons, maneuver elements, or both. The reserve is organized to destroy or repulse the enemy by offensive action and must be prepared for timely commitment on division or-



1. Forward defense echelon relatively light. Reserve dispersed in assembly areas.
2. Priority for allocation of combat power to reserve.
3. Blocking positions are located to contain or slow enemy penetrations for subsequent attack by the reserve echelon.
4. GOP force is taken from the reserve echelon or other forces available to the commander.

★Figure 7-1. Typical disposition of a divisional engineer battalion in a mobile defense.



1. Forward defense echelon contains bulk of combat power.
2. Priority for allocation combat power to forward defense.
3. Defense plans to accept decisive engagement and accomplish mission along forward edge of the battle area.
4. Emphasis is on retention or control of specific terrain.
5. Counterattacks are made to eject or destroy enemy penetrations of the forward edge of the battle area.

★Figure 7-2. Typical disposition of a divisional engineer battalion in an area defense.

der. Should it be infeasible for the division to counterattack, the reserve may be employed in a blocking role to assist in containing the enemy penetration prior to the launching of the corps counterattack. One brigade headquarters normally is designated to control the reserve. However, in some situations, the reserve may be controlled by a provisional task force headquarters or placed under division control.

★*d. Primary Combat Support Missions in the Defense.* Engineers may be attached to or placed in direct support of the brigades. Normal support is one engineer company for each brigade, although this is varied to meet specific requirements. Engineers with the security force normally are attached. The engineer battalion, less elements attached to major subordinate units, is kept under division control. The primary combat support missions of the division engineers in the defense are to increase the defensive capabilities of combat troops by assisting in the organization

of the ground, impeding and hampering enemy movement and assisting in the movement of our own forces and supplies. Organization of the ground is defined as "the development of a defensive position by strengthening the natural defenses of the terrain and by assignment of the occupying troops to specific localities." Engineers may prepare demolitions, lay minefields, and prepare and maintain routes. Obstacles are used extensively in the defense. Time permitting, the defensive capabilities of the ground are augmented by artificial obstacles and improvement of natural obstacles until a barrier system has been created through which the enemy cannot penetrate without a prohibitive expenditure of men and materials. The installation of obstacles is the responsibility of the area or sector commander; however, the commander may call upon engineers to supervise the construction and, if necessary, to perform the construction. For prescribed types of fortifica-



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CHAPTER 9

COMMUNICATIONS

9-1. Introduction

a. The Division Signal Battalion installs, operates and maintains the division communication system for support of division level functions including command and control, intelligence, fire-power and combat service support. The system is composed of a number of command and forward area signal centers interconnected by multi-channel communications links, ground and air messenger service and radio/wire integration stations (FM 11-50).

★b. The division communication system normally will consist of—

(1) A multichannel communication system which links together the division main and alternate headquarters with division artillery, support command, three brigades headquarters, aviation elements, the ADA battalion and three forward area signal centers.

(2) Command signal centers for echelons of the division headquarters, the support command and support for the units located in the vicinity of these headquarters and three signal centers in the forward area of the division zone of operations. Each signal center provides message center, cryptographic, teletype, telephone, and radio (excluding internal radio nets) service for all units in the vicinity of the signal centers. This service is over and above that provided by the organic capability of the supported unit.

(3) Division motor and air messenger service to major subordinate commands.

(4) Radio wire integration stations at all echelons of division headquarters (except division rear), the division support command, and at the three forward area signal centers for radio access to the division telephone system.

c. The signal centers provide points of entry into the system for the supported headquarters, units, and installations to facilitate their use of trunk lines and channels in the system. For instance, if a company commander of an engineer

company attached to a brigade has to request specialized equipment from the engineer battalion he may enter the communications system through the signal center nearest him by either FM radio or telephone.

★9-2. Responsibilities

a. Each commander is responsible for the establishment, operation, and maintenance of the communication system of his command. Effective communication is essential to the control of the battalion and its elements. The battalion uses a combination of radio, radio-teletype, wire, visual, sound, and messenger communications.

b. Signal security is a command responsibility. Thus, commanders at each echelon are responsible for making sure that subordinates are trained in the proper use of the communication-electronics operation instructions (CE01) and the communications-electronic standing instructions (CESI), include authentication, authorized codes, communication security (COMSEC) equipment and other signal security (SIGSEC) techniques (FM 32-5 and FM 32-6).

c. Effective communication is a result of the joint effort of units concerned, even though one of those units has primary responsibility for establishing and maintaining communications with another. In the event of a communications failure, units concerned take immediate action to locate and eliminate the trouble and continue such action until contact is regained.

d. Divisional engineer battalion headquarters includes a communications section. The section operates under the immediate supervision of the communication-electronics officer, a member of the battalion staff. The communications section provides the following services:

(1) Supervises the operation of the battalion communications system.

(2) Installs wire line to companies and staff sections.

(3) Operates the battalion message center and switchboards and provides messenger service.

(4) Operates panel displays and message pickup facilities.

(5) Operates the NET CONTROL STATION (NCS) and the retransmission station of the battalion FM (Frequency Modulated) command net.

(6) Operates a station in the division operation and intelligence net and a station in the administrative and logistics net (RATT-Radio Teletypewriter).

(7) Provides organizational maintenance of communications equipment of headquarters company, and assists the companies in performance of their maintenance.

(8) Provides facilities for encrypting and decrypting messages.

(9) Operates in the Division CG Command (FM) Net.

e. Each engineer company commander is responsible for the installation, operation, and maintenance of his portion of the communications system. He insures that his subordinates are properly trained to assist him in the execution of his communications responsibilities. The communications chief is the principal assistant to the company commander in communications matters. Each company headquarters is authorized personnel to perform the following tasks:

(1) Providing organizational maintenance on radios and radio related equipment of the company.

(2) Supervising the operation of the company communications system.

(3) Installing wire lines to platoons.

(4) Operating the company message center and switchboard.

(5) Operating a station in the company net and monitoring either the battalion command or supported organization commander's net, as directed.

(6) Encrypting and decrypting messages.

9-3. Wire Communication

★a. The widely dispersed operations of the engineer battalion preclude extensive use of organic wire for communication among elements of the battalion other than connections to the nearest division signal center (s). A typical wire net for the battalion is shown in figure 9-1.

b. The battalion communications section installs local telephones required for the operation of the battalion headquarters.

c. Engineer companies enter the wire system of the supported organization and thereby are provided entry into the division multichannel communications system. Wire communication is provided at worksites as required. Units use wire communication to control traffic through minefields and barriers.

9-4. Division Radio Nets

★a. *Divisional RATT Nets.* The divisional engineer battalion communications section operates two AN/GRC-142 radio teletypewriters (RATT), one in the division operations/ intelligence net and one in the division administration/logistics net.

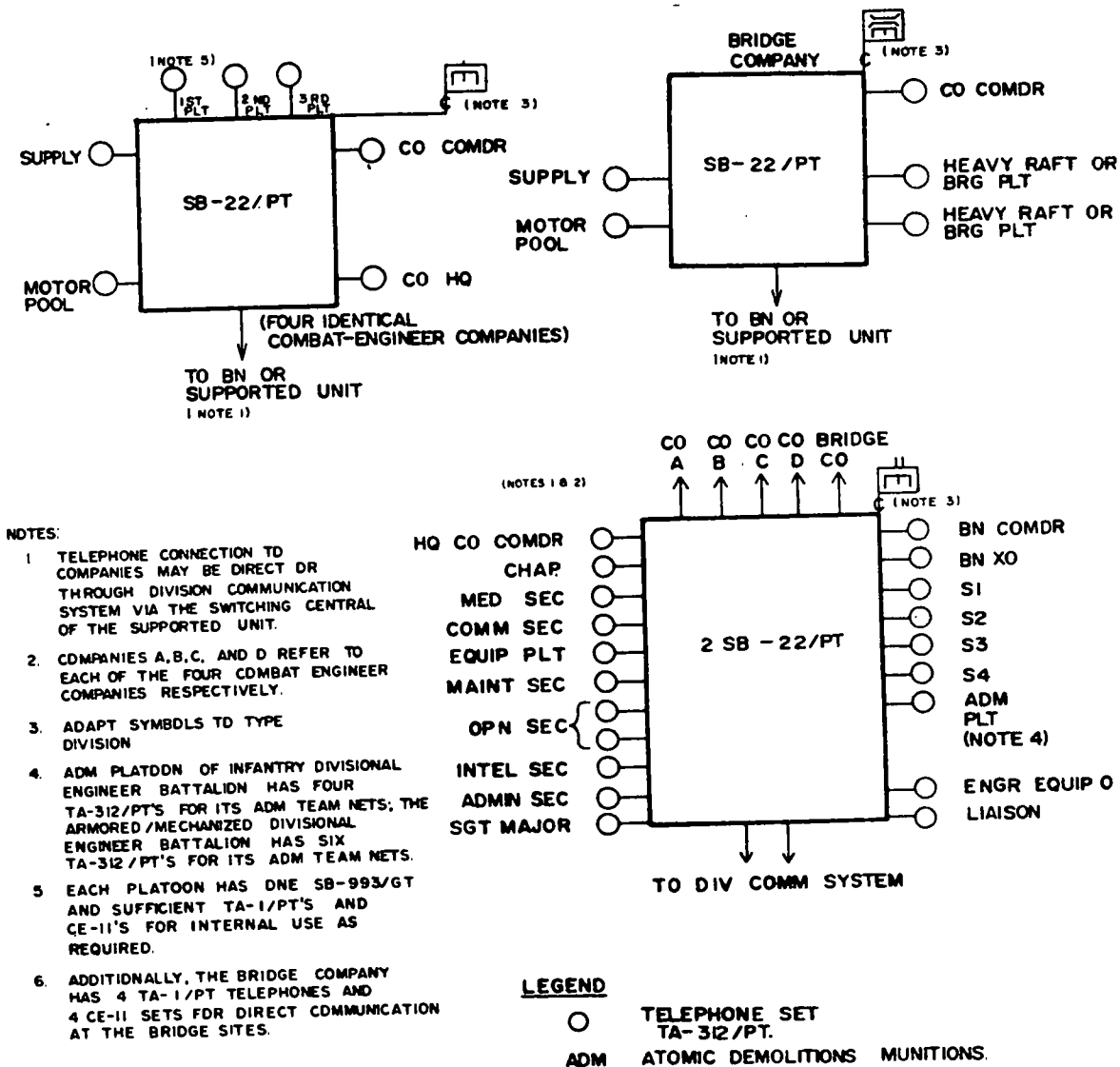
b. *Division CG/Command Net.* This is an FM voice net. It links the division commander and staff and the commanders of all immediate subordinate units. The division engineer operates in this net and the assistant division engineer officer monitors it.

★9-5. Battalion Radio Nets

Engineer Battalion Command Net (FM). The battalion command net links elements of the battalion over the ranges expected during normal operations. Command, operational, intelligence, and logistical traffic are carried on this FM net. It is the primary communication means for the battalion. It is primarily for the use of the battalion command and control. When a company is supporting another organization, the company commander's and the company headquarters' FM radios normally monitor this net, and operate in the supported organization commander's command net (FM). Figure 9-2 depicts the radio net of the engineer battalion, infantry division, while figure 9-3 depicts the radio net of an engineer battalion, armored or infantry (mechanized) division.

9-6. Company Radio Nets

★a. Organic equipment of the combat engineer companies and the bridge company of the divisional engineer battalions provides FM radios for internal command and control and for contact with the supported unit. Combat engineer companies of the battalions operate radio nets as shown in figures 9-4 and 9-5. Figures 9-6 and 9-7 show radio nets for the bridge company



★Figure 9-1. Typical wire net, divisional engineer battalion.

when equipped with either the M4T6 or class 60 bridge, or when equipped with the MAB.

★b. The communications section of the company headquarters operates a station in the company command net (FM) and monitors either the battalion command or supported organization commander's net, as directed.

c. The company commanders' radio is used to maintain contact with his subordinate elements and monitor the battalion net or that of the supported organization commander.

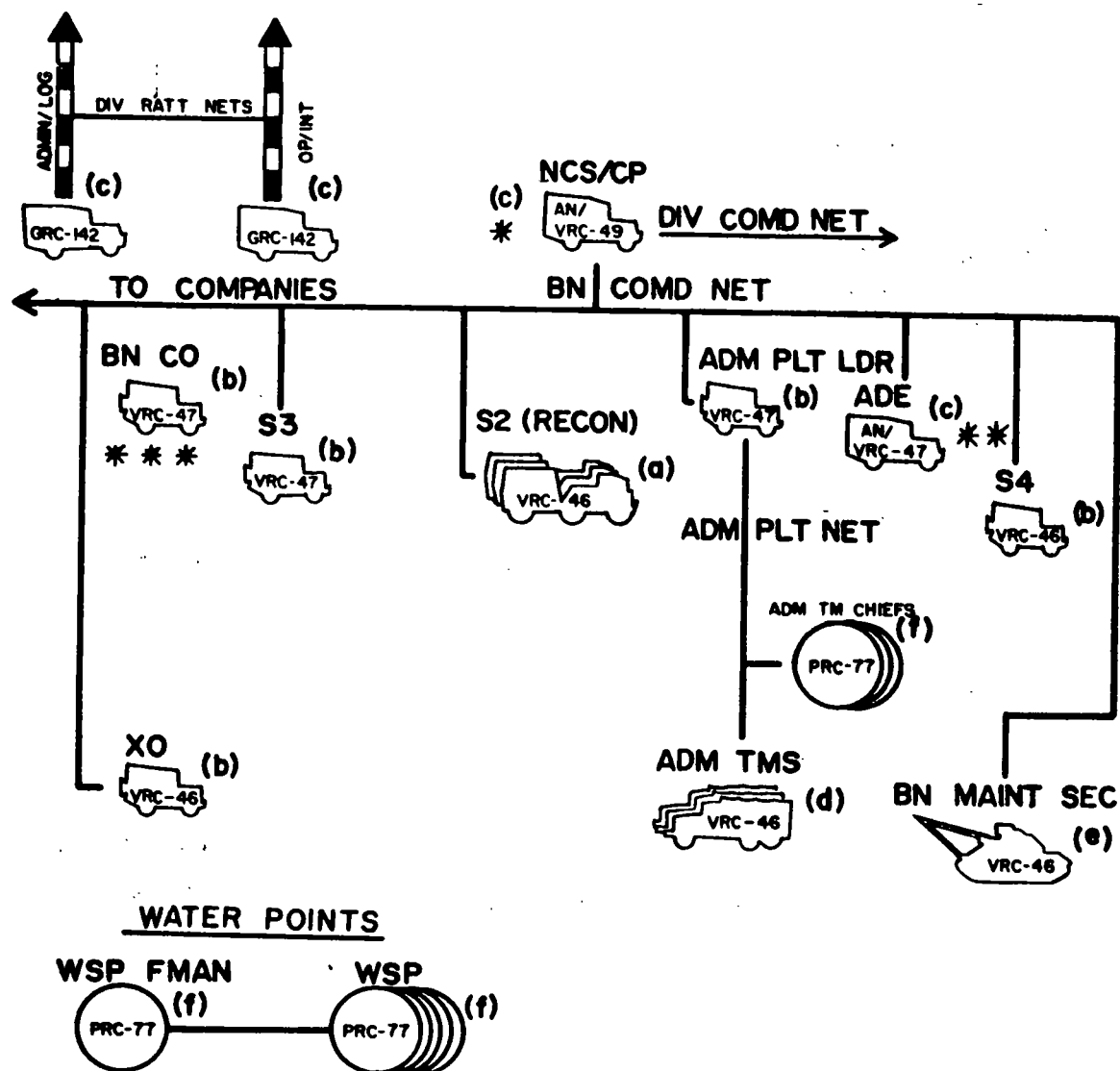
d. The platoon radio communication capabilities are as follows:

(1) The platoon leaders of the combat engi-

neer companies can operate in two nets. One is the company command net or, if the platoon is in a support role, the supported organization commander's net; the other is the platoon net.

(2) The platoon leaders of the bridge company have radios similar to those in company headquarters. Employment of radios in the platoon is the same as in the combat engineer platoons.

e. The combat engineer vehicles of the engineer companies and the armored vehicle launched bridge launchers of the bridge company operate in their respective units' net, except when in a support role, at which time they operate in the supported unit's net.

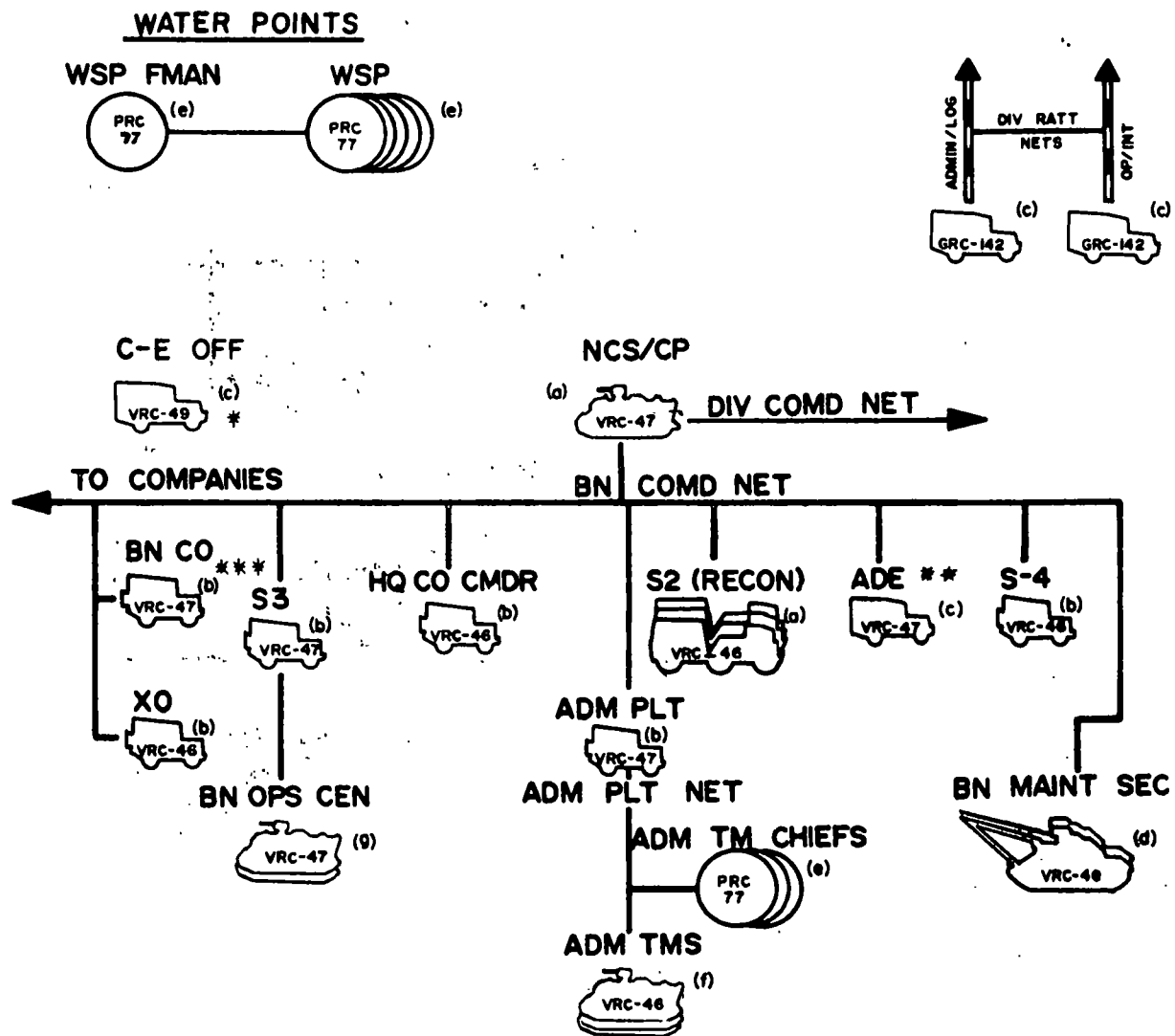


★Figure 9-2. Radio net, engineer battalion, infantry division.

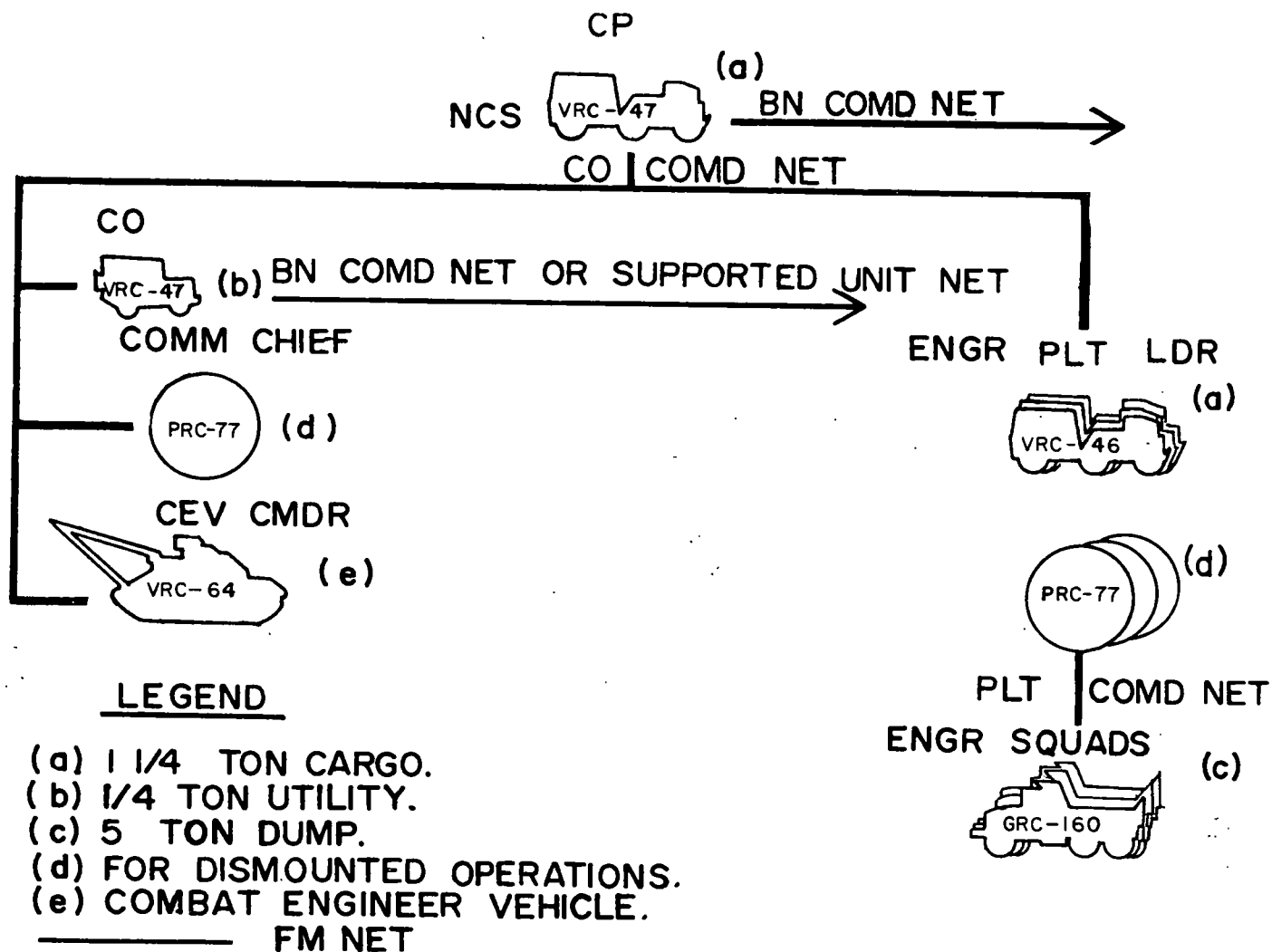
★9-7. Radio Communication With Supporting Engineer Units

★Nondivisional engineer combat units of the engineer combat groups use FM radios for their

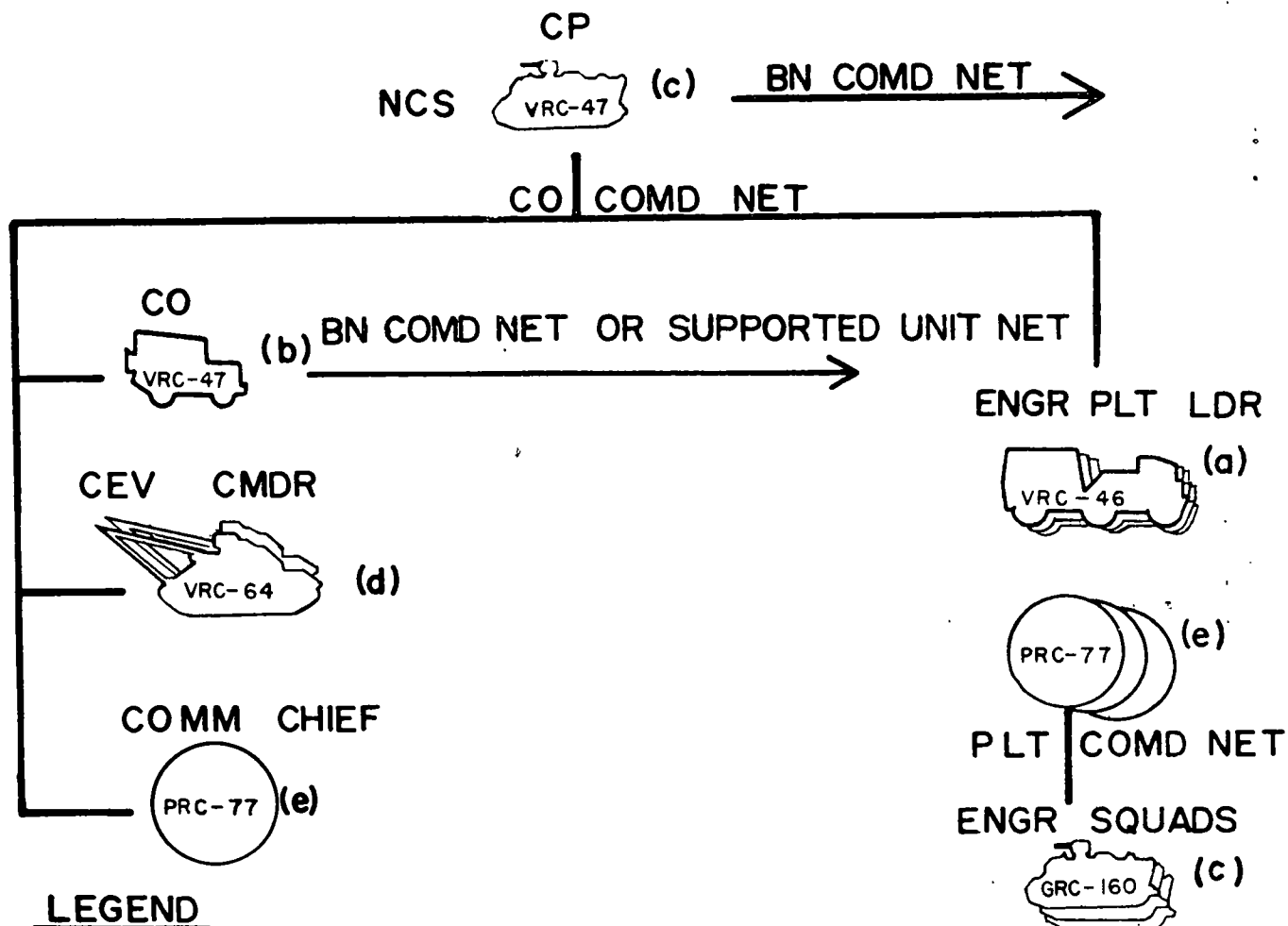
primary means of radio communication. A supporting nondivisional engineer unit normally establishes and maintains communication with the supported divisional engineer battalion.



★Figure 9-3. Radio net, engineer battalion, armored or infantry (mechanized) divisions.



★Figure 9-4. Radio net, engineer company, engineer battalion, infantry division.

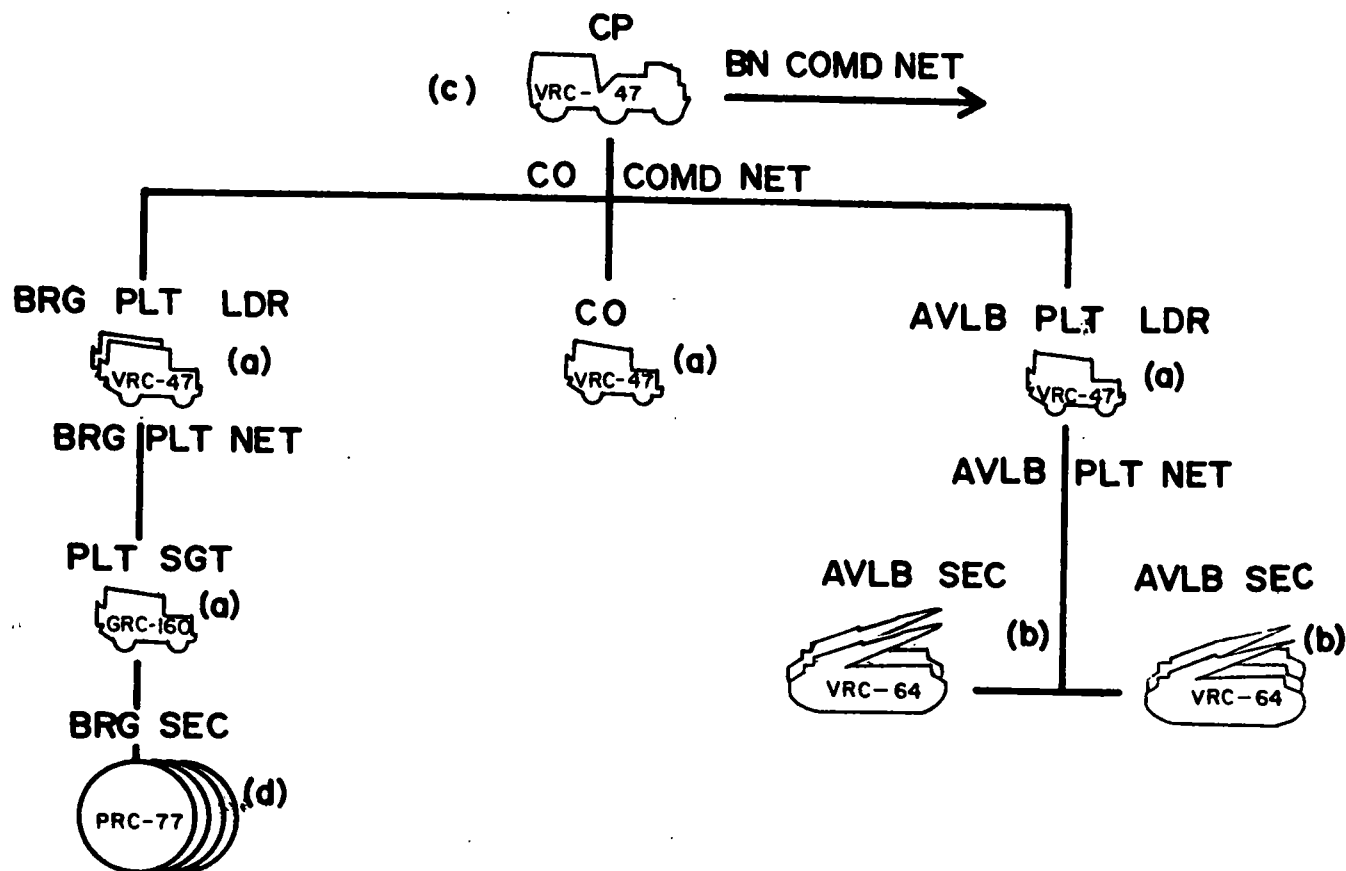


LEGEND

- (a) 1 1/4 TON CARGO.
- (b) 1/4 TON UTILITY.
- (c) ARMORED PERSONNEL CARRIER (APC)
- (d) COMBAT ENGINEER VEHICLE (CEV).
- (e) FOR DISMOUNTED OPERATION.

—— FM NET

★Figure 9-5. Radio net, engineer company, engineer battalion, armored or infantry (mechanized) divisions.

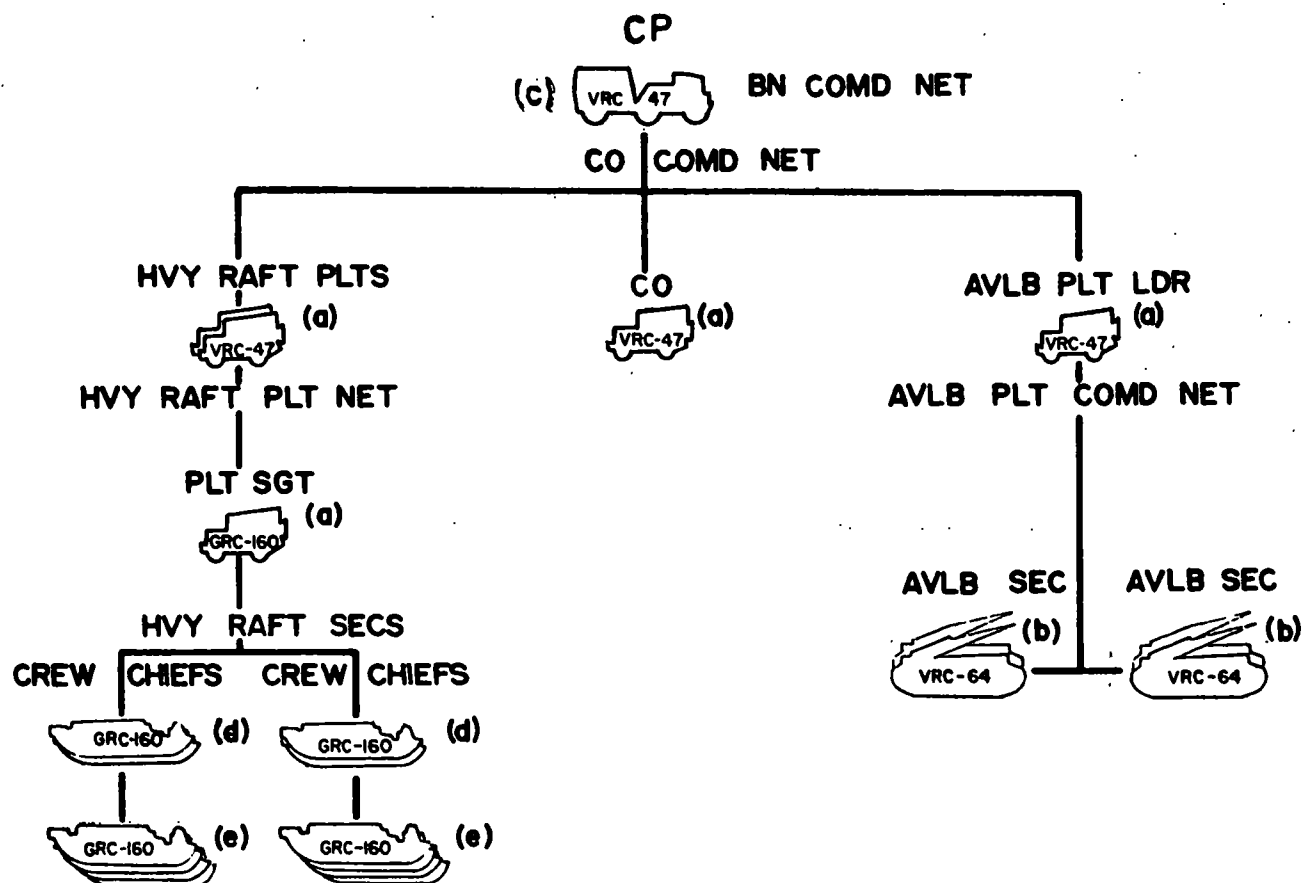


LEGEND

- (a) 1/4 TON UTILITY
- (b) ARMORED VEHICLE LAUNCHED BRIDGE (AVLB)
- (c) 1 1/4 TON CARGO
- (d) FOR DISMOUNTED OPERATION

———— FM

★Figure 9-8. Radio net, bridge company, divisional engineer battalion (when equipped with M4T8 or Class 60 bridge).



LEGEND

- (a) 1/4 TON UTILITY
- (b) ARMORED VEHICLE LAUNCHED BRIDGE (AVLB)
- (c) 11/4 TON CARGO
- (d) MAB (END BAY)
- (e) MAB (INTERIOR BAY)

— FM

★Figure 9-7. Radio net, bridge company, divisional engineer battalion (when equipped with MAB).



CHAPTER 10

COMBAT SERVICE SUPPORT

★QUADRIPARTITE STANDARDIZATION AGREEMENT—245

10-1. Introduction

This chapter covers the method by which the divisional engineer battalion receives its combat service support within the division. Additionally, it covers the administrative, logistical and maintenance areas of responsibility within the battalion as well as the battalion's responsibility to the division for production of potable water. The procedures described herein are intended as a guide and are subject to modification by appropriate regulations, directives, and policies of higher headquarters.

a. Division Support Command. The division has, as a major subordinate unit, a division support command which is organized on a functional basis to provide division level combat service support. It provides the following support to all elements of the division; supply, transportation of supply (less class V), direct support maintenance (except medical, cryptographic, and quartermaster air equipment), medical service, and miscellaneous services. Direct support maintenance of medical and quartermaster air equipment is provided by field army support command (FASCOM) units. Direct support maintenance of cryptographic equipment is provided by the division signal battalion. The division support command is an operational command directly under the division commander (FM 54-2). Detailed functions and procedures pertaining to subordinate units of the division support command are covered in separate field manuals.

b. Division Administration Company. The division administration company, organic to the division support command, provides the necessary personnel and administrative services to sustain the division. This includes replacement support and a centralized personnel service for all units assigned and attached to the division. It also provides direct support maintenance of electric accounting machine equipment. The company operates under the general staff supervision of the

division G1. For details of the employment of the administrative company, see FM61-100.

10-2. Administration

a. Administrative Responsibilities. Administrative responsibilities within the battalion include maintenance of unit strength; submission of reports; provision of morale and personnel services; discipline, law and order; and collection and evacuation of the dead and of prisoners of war.

b. Maintenance of Unit Strength. The battalion adjutant forwards personnel requisitions to the division adjutant general, using as a basis vacancies existing in the companies. Receipt and processing of these individual replacements into the battalion is supervised and coordinated by the adjutant. In the interest of morale and efficiency, replacements are retained in the division replacement section for the shortest practicable time, about 48 hours. They are moved to the battalion under battalion escort, using either unit or division transportation. Here they receive further indoctrination in the history, traditions, mission, and current situation of the battalion. Replacements are then moved to their assigned companies.

c. Submission of Reports. The companies informally furnish the battalion adjutant with necessary information for the company morning report, the personnel daily summary report, and, when required, a casualty and loss report. This information is relayed to the division administration company through the S1 section. The personnel staff NCO in the S1 section of battalion maintains close liaison with the division administration company on these and other personnel matters. The battalion adjutant keeps the commander informed concerning personnel policies of higher headquarters and advises him on matters of personnel, morale, discipline, and esprit de corps within the battalion.

d. Morale and Personnel Services. The company commander is responsible for the morale and welfare of members of the company. He insures that leave and rest quotas are equitably allocated and that these quotas are filled when conditions permit. Emergency leaves are processed expeditiously in accordance with regulations and policies. He insures that all personnel are familiar with awards and decorations policies and that draft recommendations are promptly forwarded to battalion for preparation in final form. He insures that the pay and allotment of his men is correct, that the mail is promptly delivered and properly handled, and that service such as legal assistance, welfare, army exchange, special services, and chaplain's assistance are made available and are properly utilized. The battalion adjutant assists the company commander in the foregoing responsibilities and insures the overall efficient operation of these services throughout the battalion.

e. Discipline, Law, and Order. The company commander is responsible for all matters pertaining to discipline, law, and order within the company. When appropriate, he exercises jurisdiction under Article 15, Uniform Code of Military Justice, or prefers charges. Charge sheets and allied papers normally are prepared by clerks of the battalion S1 section from information furnished by the company commander. The battalion commander exercises summary and special court-martial jurisdiction. He appoints court-martial boards for prompt disposition of cases occurring within the organization. The battalion adjutant maintains statistics on all absences without leave, stragglers, awards and punishments, court-martial actions, and other matters reflecting the status of discipline law and order within the command. He maintains records to insure that corrective action is taken when required.

f. Collection and Evacuation of the Dead. The company commander is responsible for collecting, identifying, and evacuating the dead, and for safeguarding his personal effects, while in the area of his control. The dead are identified as early and as fully as possible. Deceased personnel normally are evacuated to the battalion or supported organization's graves registration and evacuation point on available transportation. Personal effects are not removed from the body. Isolated burials are resorted to only as an emergency measure. When isolated burials are authorized, they are fully documented and reported promptly through graves registration channels.

Details of graves registration service are covered in FM 10-63.

g. Collection and Evacuation of Prisoners of War. The company commander is responsible for the proper handling of prisoners of war in accordance with the Geneva Convention of 1949 and for their evacuation to a prisoner of war collecting point. The adjutant prepares and supervises the executions of plans for the collection and evacuation of prisoners of war. He must be careful to insure that these plans conform to the directives of higher headquarters and that they are sufficiently comprehensive. He coordinates with S2 for estimates on prisoners anticipated and facilities for any interrogation desired, and with S3 for necessary guards for prisoners while they are being evacuated. He coordinates with S4 for transportation to evacuate prisoners of war and with the battalion surgeon for evacuation of wounded prisoners.

10-3. Supply Functions

The principal functions performed by the battalion in supply matters are those of acquisition and evaluation. The battalion draws supplies from supporting units and makes distribution within the battalion. It also takes excess or unserviceable supplies from subordinate units and disposes of them through prescribed channels. Additionally, captured enemy materiel will be disposed of through prescribed channels. The property responsibilities of the commanders are identical with those of commanders at all echelons. These command responsibilities are to insure that all property pertaining to the command is adequately administered, safeguarded, accounted for, and used.

10-4. Supply Responsibilities

a. Battalion Commander. The battalion commander discharges his supply responsibilities through the supply staff officer (S4). He insures that commanders of subordinate units properly conduct supply functions within their commands. He checks on the efficiency of supply operations through frequent personal inspections and by reports of inspections turned in by his S4. Immediate action to correct supply problems or discrepancies found as a result of inspections is the responsibility of the commander. He must insure that his staff accomplishes proper corrective action.

b. Battalion Supply Officer (S4). The battalion supply officer (S4) is responsible for closely supervising the supply activities of all subordinate units. He maintains informal accountability for

development programs within a host country which is not included in classes I through IX.

★10-6. Water Purification (Quadripartite Standardization Agreement-245).

a. Water Production Teams. Within the battalion S4 section there are five water production teams equipped with five water purification sets, organic transportation and sufficient personnel to operate and maintain equipment. Under the staff supervision of the S4, these teams produce potable water for the division. Normally, one team provides area support in each brigade area base, one team provides area support in the division area base, and one is kept in reserve. Whether sent to a specific location or attached to an engineer company, the team operates alone. The location of the team determines how it gets its rations. It may be attached to an adjacent unit for rations; rations may be delivered to it by the engineer company to which it is attached or by headquarters company; or the team may prepare its own food on small cooking units.

b. Water Points. With the water purification sets, the water production teams establish the water points required by the division. Each unit of the division draws water from the point nearest it. Water point locations are reported to the supported brigade and to the engineer battalion headquarters. Battalion, in turn, reports these locations to the G4.

c. Sources of Water. Water usually is obtained from local sources determined by reconnaissance by S2 personnel. It is made potable with water purification equipment organic to the engineer battalion. When a source of water is not available in the division area, the division engineer has the staff responsibility for obtaining water elsewhere and stocking it at division water points.

d. Operation of Water Points. The tactical situation and the sources of water normally dictate the location and hours of operation of water points. Road nets, parking areas, and concealment are only slightly less important considerations. Normally, units are permitted to draw water at any time the water point is in operation. If water is limited in quantity or the demand excessive, units may be permitted to draw water only at scheduled times. Normally, the G4 establishes these schedules. Units should draw water as soon as practicable after the opening of the water point, as the water purification

equipment must be dismantled before the next move in time to accompany the force which it is supporting. The battalion S4 is responsible for coordination of displacement of water points with the water point teams and with G4 for closeout times of old points and opening times and locations of new points; and for coordination with the battalion S3 for preparation of water point sites, with the division surgeon for water purity control, and with the provost marshal for traffic control.

10-7. Maintenance

a. Organizational Maintenance. The battalion maintenance section, under the control of the maintenance warrant officer, insures that the organizational maintenance requirements of the battalion are satisfactorily met. Incoming repair work is checked to see if proper operator maintenance has been performed and to determine the extent of repairs needed. Completed work is checked to see that equipment is in operating condition before it is released from the maintenance section shop. The battalion maintenance section also provides technical help to company motor pool personnel.

★*b. Direct Support Maintenance.* The maintenance battalion of the support command provides direct support maintenance for all material except medical, electric accounting, quartermaster air and cryptographic equipment. Normally, one forward support company is placed in support of each brigade and operates in the brigade trains area. It provides direct support maintenance for construction, tank-automotive, and electric equipment for the units in the area. The forward support company has a limited materiel recovery and evacuation capability. The heavy maintenance company operates in the division support area, providing direct support maintenance for mechanical, armament, engineer, quartermaster and power generation equipment to those elements of the division not supported by the forward support companies, and backup maintenance support for the forward support companies. The light maintenance company provides direct support electronic equipment maintenance and repair parts service for those elements located in the main division support area and supplementary support for the forward support companies. The battalion maintenance section requisitions repair parts from the support company designated. The basis of

requisition will be to replenish its prescribed load of repair parts.

c. *Evacuation of Damaged Material.* Units of the battalion are responsible for initial recovery of damaged equipment. Large items such as cranes or other vehicles may be evacuated to

the brigade axis of evacuation or to division collection points. Small items are evacuated to the collection points. The heavy maintenance company of the maintenance battalion operates the main division collection point and provides evacuation service for the materiel supported.

FIELD MANUAL

No. 5-135

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 11 May 1970

ENGINEER BATTALION, ARMORED, INFANTRY, AND INFANTRY (MECHANIZED) DIVISIONS

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CHAPTER 1

INTRODUCTION

1-1. Purpose and Scope

a. This manual provides guidance for commanders, staff officers, and other personnel concerned with the employment of the divisional engineer battalions organic to the infantry, mechanized, and armored divisions.

b. This manual covers the organization, missions, capabilities, and operations of the divisional engineer battalions and their components (fig 1-1, 1-2, and 1-3). Coverage is in sufficient detail to guide commanders and staffs in the accomplishment of the unit mission.

c. The contents of this manual, unless otherwise specified, apply to—

(1) General war, including consideration of employment of nuclear munitions and chemical and radiological agents; and protection from nuclear munitions and chemical, biological, and radiological agents.

(2) Limited war.

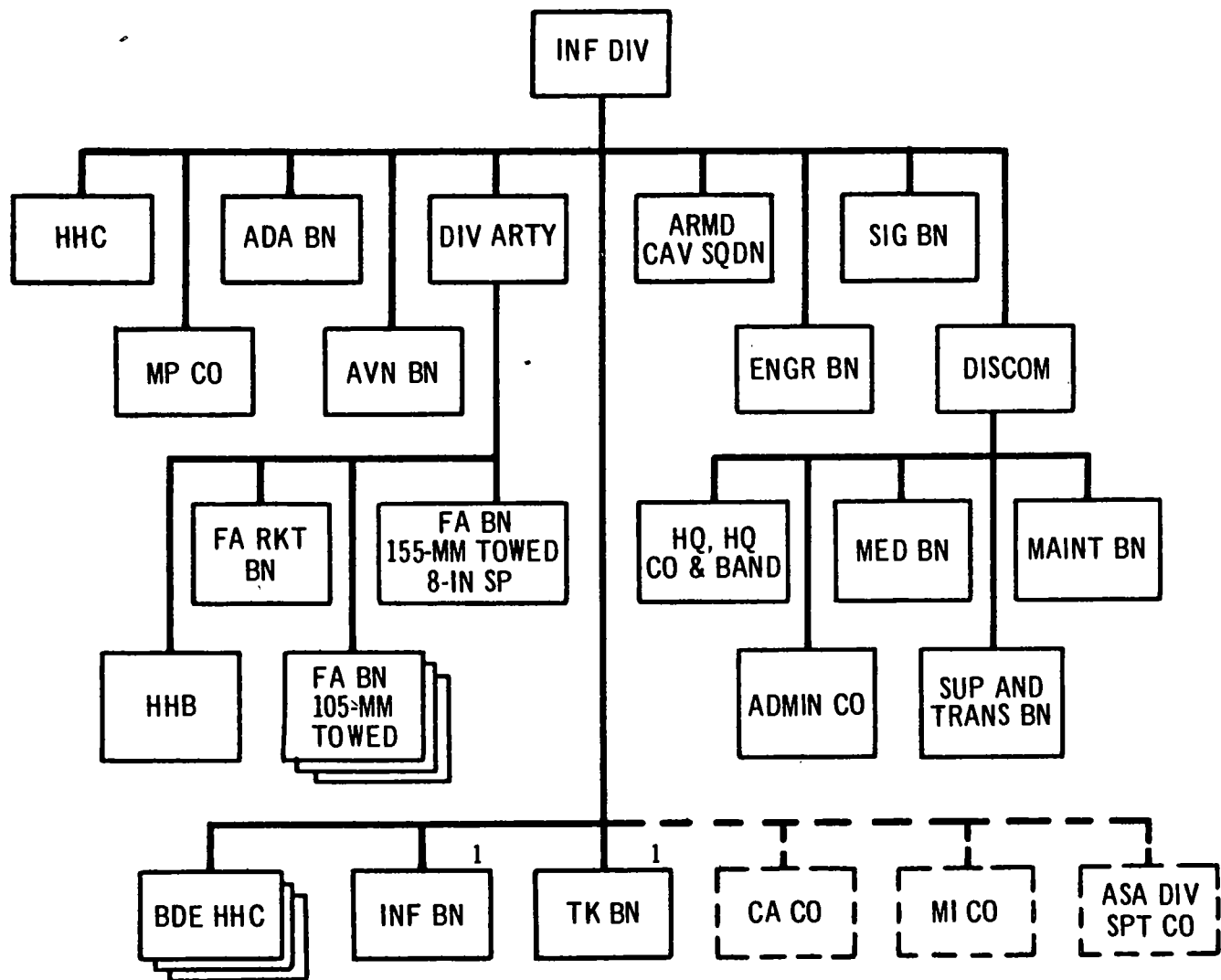
(3) Cold war, to include stability operations.

d. This manual is in consonance with the following International Standardization Agree-

ments which are identified by type of agreement and number at the beginning of each appropriate chapter in the manual: SOLOG 125, Potability Standards for Field Water Supply; STANAG 2123, Non-nuclear Demolition Target Folder.

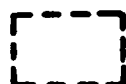
1-2. Recommended Changes

Users of this manual are encouraged to submit recommendations to improve its clarity or accuracy. Comments should be keyed to the specific page, paragraph, and line of the text in which the change is recommended. Reasons will be provided for each comment to insure understanding and complete evaluation. Comments should be prepared using DA Form 2028 (Recommended Changes to Publications) and forwarded direct to Commanding Officer, U.S. Army Combat Developments Command Engineer Agency, Fort Belvoir, Virginia 22060. Originators of proposed changes which would constitute a significant modification of approved Army doctrine may send an information copy, through command channels, to the Commanding General, U.S. Army Combat Developments Command, Fort Belvoir, Virginia 22060, to facilitate review and followup.



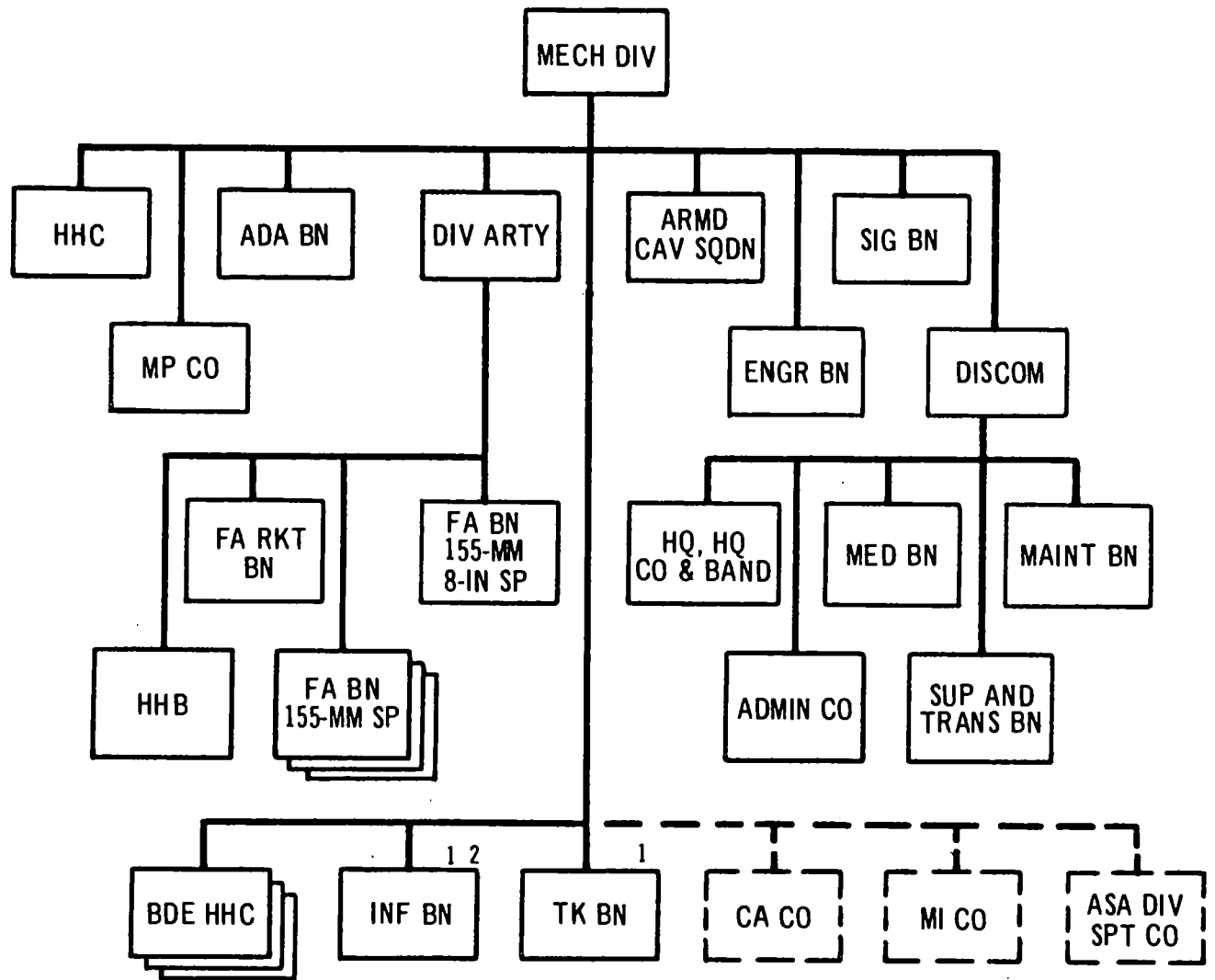
¹Number and type of battalions vary based on mission and operational environment.

LEGEND



Indicates normal attachment.

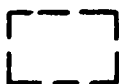
Figure 1-1. Infantry division.



¹Number and type of battalions vary based on mission and operational environment.

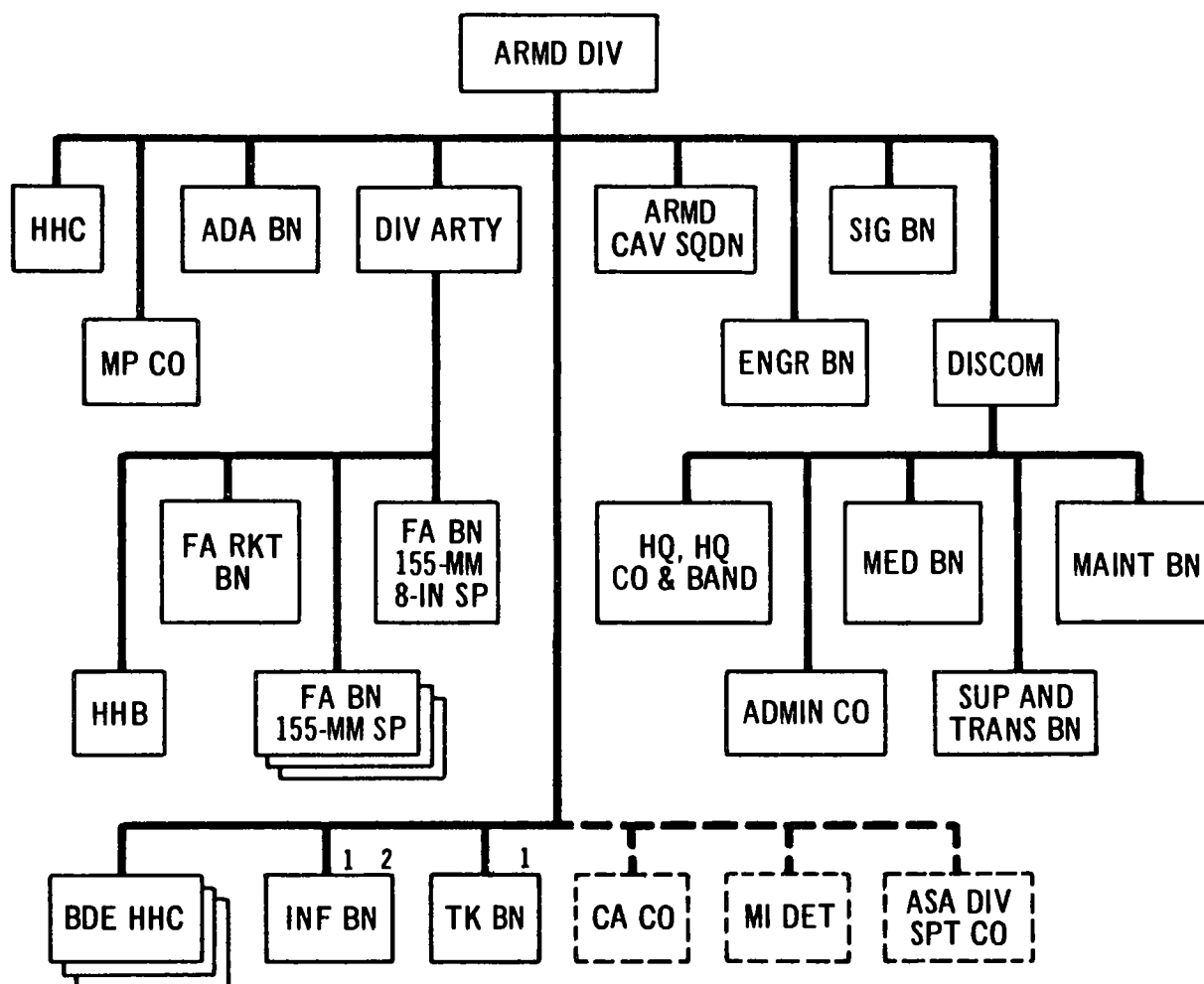
²Mechanized infantry.

LEGEND



Indicates normal attachment.

Figure 1-2. Mechanized division.



¹Number and type of battalions vary based on mission and operational environment.

²Mechanized infantry.

LEGEND

 Indicates normal attachment.

Figure 1-3. Armored division.

CHAPTER 2

DIVISIONAL ENGINEER BATTALIONS

2-1. Organization

The infantry division engineer battalion is organized under TOE 5-155 and the mechanized and armored division engineer battalions are both organized under TOE 5-145. Each consists of a headquarters and headquarters company, four identical combat engineer companies and one bridge company (fig 2-1).

2-2. Mission

The mission of the division engineer battalion is to—

- a. To increase the combat effectiveness of the division by means of engineer combat support.
- b. To undertake and carry out an infantry combat mission when required.

2-3. Capabilities

- a. *Level 1.* At TOE Level 1 this unit provides—

- (1) Engineer staff planning and supervision for organic and attached engineer troops.
- (2) Construction, repair and maintenance of roads, bridges, fords and culverts.
- (3) Support of hasty stream crossing operations with boats, rafts, and bridges; coordination of organic and attached engineer troops in support of deliberate stream crossings.
- (4) Fixed bridging for passage of short gaps.
- (5) Assistance in the emplacement of obstacles, including mine and booby traps.
- (6) Planning for, preparation and execution of firing of atomic demolitions munitions (ADM). When required, this capability is increased by the attachment of TOE 5-570 cellular type ADM teams.
- (7) Technical assistance to other troops in preparation of fortifications and camouflage.
- (8) Engineer reconnaissance and producing engineer intelligence.
- (9) General construction works, including construction of landing strips.

- (10) Construction and placement of deceptive devices and technical assistance in camouflage operations.

- (11) Organizational maintenance of engineer, ordnance, and signal equipment organic to the battalion.

- (12) Personnel and equipment for water purification and the supply of potable water.

- (13) Technical advice to supported units on engineering matters, including recommendations for employment of engineer troops.

- (14) Assistance in the assault of fortified positions.

- (15) Locally available materials for construction.

- (16) A unit to undertake and carry out and infantry combat mission, when required.

- b. *Levels 2 and 3.* The Levels 2 and 3 columns adapt the TOE for reduced operational capabilities in decrements of 10%, from approximately 90% for Level 2 to 80% for Level 3.

- c. This unit is not adaptable to a type B organization.

2-4. Limitations

- a. Has a limited capacity for earthmoving and requires equipment and personnel support for projects involving considerable earth-work.

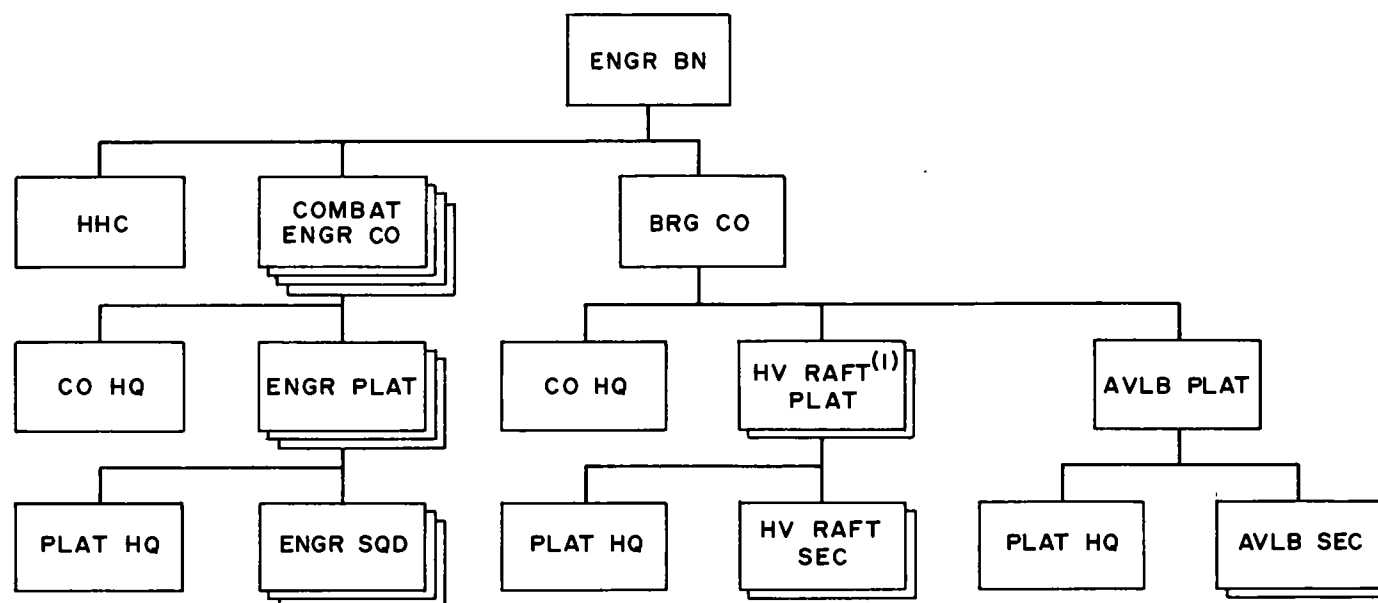
- b. When assigned an infantry combat role, requires fire support (mortars and artillery), forward observers, and time to reorganize for combat.

2-5. Allocation, Category and Mobility

- a. *Allocation.* This unit is allocated on the basis of one per Infantry, Armored, or Infantry (Mechanized) Division.

- b. *Category.* This unit is designated a category I unit, (AR 320-5).

- c. *Mobility.* This unit is 100 percent mobile with organic transportation.



1. The bridge company may be organized with two bridge platoons in place of the heavy raft platoons. Each bridge platoon has a platoon headquarters and two bridge sections.

Figure 2-1. Organizational chart, divisional engineer battalion.

2-6. Equipment

The divisional engineer battalion is equipped with the weapons, construction equipment, hand-tools, power tools, bridging, and other equipment that will enable it to accomplish day-to-day engineer missions in support of the division. In situations where the battalion lacks the means to provide the engineer support required by the division, the next higher command echelon provides additional equipment or additional engineer units to accomplish the mission. The applicable TOE should be consulted to determine the amount and types of equipment authorized in the various units of the battalions. A theater commander or other major commander may authorize additions to or deletions from the equipment of organizations under his command; therefore, the unit equipment may vary between commands. Army aviation support for the engineer battalion may be provided by corps aviation units for armored and mechanized infantry divisions or by the aviation battalion of the infantry division. Engineer companies in a direct supporting mission receive army aviation support through the supported unit. Army aircraft may be provided upon request to airlift troops and equipment.

2-7. Employment

- a. The engineer battalion is designed to pro-

vide engineer combat support in the forward portion of the battle area. It has the ability to overcome a great variety of obstacles to the movement of the division and hence contributes to the mobility of the division and its capability to maneuver in offensive action. In defense, retrograde, or denial operations, it has the capability to materially impede the progress of enemy ground operations by blocking critical avenues of approach.

b. The combat engineer companies are placed in direct support of or attached to the brigade and combat elements of the division. The headquarters company has engineer construction equipment with operators to supplement the combat engineer companies for specific tasks. The bridge company provides stream and gap crossing equipment to enhance ground mobility.

c. Combat engineer companies may be associated with particular brigades so as to increase operational efficiency. The company commander serves as the engineer staff officer of the brigade.

d. When placed in direct support of a brigade, the combat engineer company gives priority to the supported brigade but operates under the control of the engineer battalion. It may be attached to a brigade for specific operations or when centralized battalion control is impracticable.

e. Engineer teams of less than platoon size normally are attached to combat elements. This is necessary when specific tasks require close command control. In the offensive, such tasks may consist of rafting, obstacle breaching, or trail cutting. In defense of retrograde, the installation of obstacles and the employment of ADM may require mission-type attachment.

f. Engineer troops engage in limited combat incident to accomplishment of their normal missions. Early relief of engineer elements is made by other combat elements to permit continuation of engineer missions. The division commander will engage the engineer battalion in an infantry combat mission when the exigencies of the situation so require their employment. Because of command and central problems inherent in performing relatively unfamiliar missions, the battalion should be committed as a unit.

g. When the armored cavalry squadron or task organizations are committed on separate missions, an appropriate engineer element is provided to the force. The supporting engineers should be mounted in vehicles similar in type to those of the supported force to insure the same tactical mobility.

h. Special requirements for engineer effort

should be considered when planning for airborne or airmobile operations. Engineer support may be required at loading areas and access routes thereto. The extent of engineer effort that is or will be required at landing/drop zones also must be considered so that sufficient engineers and engineer equipment are provided.

i. When the requirement for engineer support within the division exceeds the capability of the divisional engineers battalion, additional engineer support is provided by the next higher echelon of command.

(1) The additional engineer support to the division may range from reinforcement of the combat engineer strength to the provision of such support as bridging, road construction, debris removal, erection of barriers, mapping and other engineer intelligence, survey, camouflage, and deception.

(2) Nondivisional engineer units normally are placed in support of the division. However, engineer units are attached when their missions necessitate close command control in execution. River crossing missions, barrier demolition tasks, or use of ADM are examples of such situations. All engineer combat support provided to the division is coordinated by the division engineer.



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CHAPTER 3

HEADQUARTERS AND HEADQUARTERS COMPANY

3-1. Organization

Headquarters and headquarters company of the infantry divisional engineer battalion is organized under TOE 5-156; that of the armored and mechanized divisional engineer battalions under TOE 5-146. The three units are similarly organized (fig 3-1) and each consists of two elements; a battalion headquarters and a headquarters company.

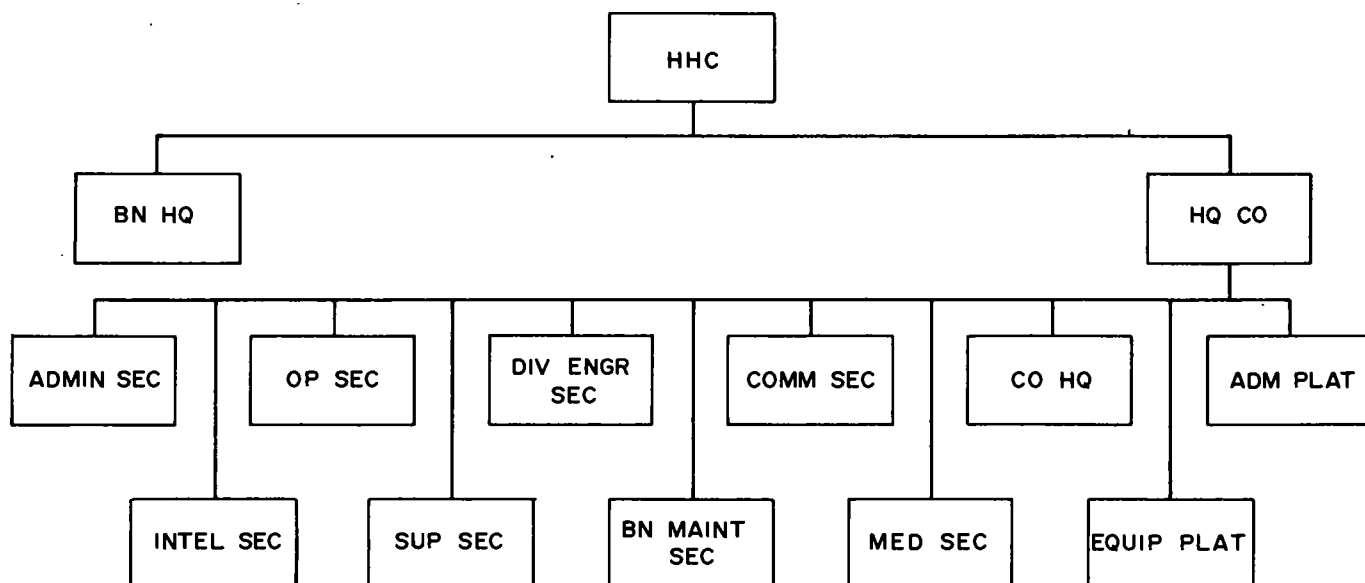
a. Battalion Headquarters. The battalion headquarters consists of—

- (1) Battalion commander (also division engineer).
- (2) Executive officer.
- (3) Assistant division engineer.
- (4) S1.
- (5) S2.
- (6) S3.
- (7) S4.

- (8) Engineer equipment officer.
- (9) Surgeon.
- (10) Chaplain.
- (11) Communications officer.
- (12) Sergeant major.

b. Headquarters Company. Headquarters company consists of a company headquarters, an equipment platoon, an ADM platoon, and the personnel of the following battalion headquarters sections:

- (1) Administration.
- (2) Operations.
- (3) Intelligence.
- (4) Supply.
- (5) Division engineer.
- (6) Communications.
- (7) Maintenance.
- (8) Medical.



NOTE: THIS CHART PORTRAYS THE SOURCE AND DISTRIBUTION OF PERSONNEL IN HEADQUARTERS AND HEADQUARTERS COMPANY. IT IS NOT A CHAIN OF COMMAND CHART.

Figure 3-1. Headquarters and headquarters company, divisional engineer battalion.

3-2. Mission

The mission of headquarters and headquarters company is to—

a. Provide an engineer special section for the division and to provide command and staff for the divisional engineer combat battalion.

b. Provide administration, operations, control, communications, reconnaissance and engineer intelligence, supply, organizational maintenance support, supplemental engineer and ordnance construction equipment, and medical services for the battalion. To provide for the production and supply of potable water for the division and for combat support by the planning and preparation for employment and firing of atomic demolition munitions (ADM).

c. Carry out infantry combat missions when required.

3-3. Capabilities

a. Level 1. At TOE Level 1 this unit provides—

(1) Staff planning of division engineer operations and supervision of organic and attached engineer troops.

(2) Potable water for the division through the operation of up to five water points.

(3) Engineer reconnaissance and intelligence for the engineer battalion and the division.

(4) Limited ADM support to the division. This capability may be increased by the attachment of TOE 5-570 ADM teams.

(5) Unit level medical service for the battalion, to include medical care and evacuation, establishment of a battalion aid station, and furnishing aid men to companies.

(6) Supplemental construction equipment and operators to elements of the battalion.

(7) Organizational maintenance for battalion equipment.

(8) Radio and wire communications for the battalion.

b. Individuals of this company, except medical personnel and the chaplain, can fight as infantry men when required. The company has the capability of defending itself and its installations against hostile ground attack.

c. When the battalion is committed to a combat role, headquarters and headquarters company functions as an infantry, infantry (mechanized) or armored infantry battalion headquarters (chap 8).

d. Levels 2 and 3. The Levels 2 and 3 columns adapts the TOE for reduced operational capabilities in decrements of 10%, from approximately 90% for Level 2 to 80% for Level 3.

3-4. Allocation, Category and Mobility

a. Allocation. This unit is allocated on the basis of one per Divisional Engineer Battalion.

b. Category. This unit is designated a category I unit, (AR 320-5).

c. Mobility. This unit is 100 percent mobile in organic transportation.

3-5. Equipment

Major items of equipment in headquarters and headquarters company include—

a. Truck mounted, 1,500 gph, water purification sets.

b. 20T, $\frac{3}{4}$ cu yd, crane shovels.

c. Graders.

d. Tractor dozers.

e. Pneumatic tool and compressor outfit.

f. 5-T dump trucks.

g. 2½ and $\frac{3}{4}$ -T cargo trucks.

h. Generator sets, 1.5 to 10KW.

3-6. Operation

The battalion commander organizes and locates his headquarters in a manner best suited for carrying out his staff and command functions.

a. Location. In addition to other considerations, the headquarters is located to facilitate communication with the division command post, subordinate units, the support command, and other supporting engineer units. The situation or the disposition of the division dictates the organization and operation of the headquarters in one, two, or three echelons. Fragmentation of the headquarters to the extent of impairing effective operation is avoided.

b. Echelons. Figures 3-2 and 3-3 depict a suggested organization and location of headquarters for operations in two and three echelons respectively. The battalion commander may organize his headquarters in two echelons when frequent moves are anticipated, to achieve dispersion, to improve communications and control, or to stay in close touch with an operation such as a river crossing. In any of these situations, the commander retains in the forward echelon the staff officers and other personnel required to assist him in fulfilling his command and staff

ENGR BN, FORWARD	ENGR BN, REAR
BN CO BN XO ADE(at Div Main CP) S1 S2 RECON OFFICERS S3 & ASST S3 COMM OFFICER SURGEON CHAPLAIN HQ Co CO ADM PLAT LEADER SMAJ CML NCO	S4(Responsible for operation of BN, REAR) UNIT SUPPLY TECHNICIAN ENGR EQUIP OFFICER ENGR EQUIP REPAIR TECHNICIAN HQ Co XO LIAISON OFFICER EQUIP PLAT LEADER COMM NCO
NOTE: Battalion forward is located near division main. Battalion rear is generally located near support command. All personnel and equipment not needed for the operation of the forward echelon remain with rear echelon.	

Figure 3-2. Organization of battalion headquarters in two echelons.

responsibilities. In a fast moving situation, the battalion commander may be operating with the division commander and his command group in the division tactical command post. In such a situation, he may organize the entire headquarters into three echelons to facilitate control and movement.

c. *Layout.* The battalion command post (CP) is laid out to facilitate security, dispersion, communications, concealment, movement to and from the area, and movement within the area. Figure 3-4 illustrates a layout when the CP is in one echelon. The assistant division engineer (ADE) is located in the tactical operations center (TOC) at the division main command post.

ENGR BN COMD GP	ENGR BN, FORWARD	ENGR BN, REAR
BN CO S2 S3 RECON OFFICERS COMM OFFICER	BN XO ADE(at Div Main CP) S1 ASST S3 SURGEON CHAPLAIN HQ Co CO ADM PLAT LEADER SMAJ CML NCO COMM NCO	S4 UNIT SUPPLY TECHNICIAN ENGR EQUIP OFFICER ENGR EQUIP REPAIR TECHNICIAN HQ Co XO LIAISON OFFICER EQUIP PLAT LEADER

Figure 3-3. Organization of battalion headquarters in three echelons.

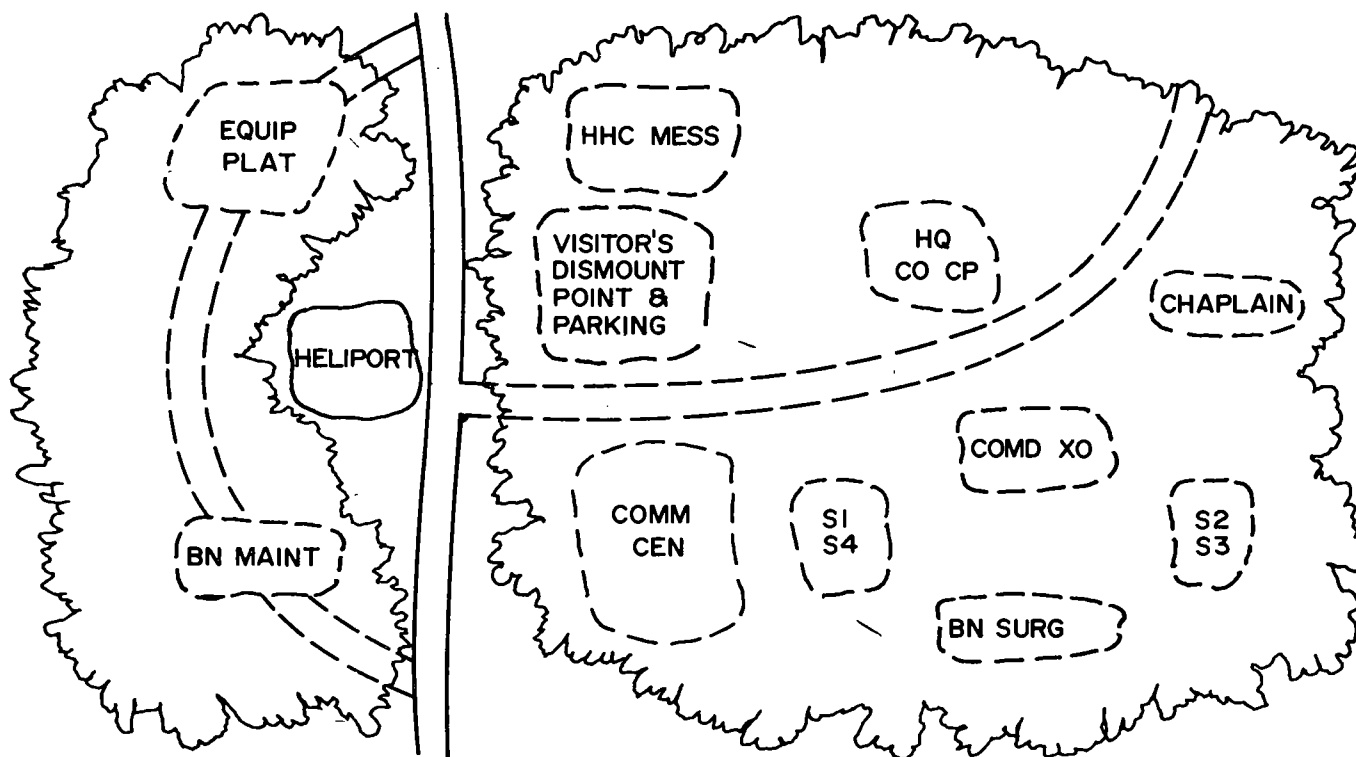


Figure 3-4. Battalion command post layout—one echelon.

CHAPTER 4

COMBAT ENGINEER COMPANY

4-1. Organization

The combat engineer company is the basic operating component of the divisional engineer battalion. The combat engineer company of the infantry division engineer battalion is organized under TOE 5-157 and those of the mechanized and armored division engineer battalions are organized under TOE 5-147. Each is organized into a company headquarters and three identical engineer platoons, each platoon consisting of a platoon headquarters and three engineer squads (fig 2-1).

4-2. Mission

The mission of the combat engineer company is to—

a. Increase the combat effectiveness of the Engineer Battalion, Armored, Infantry or Infantry (Mechanized) Division by providing engineer combat support.

b. Carry out infantry combat missions when required.

4-3. Capabilities

a. *Level 1.* At TOE Level 1 this unit provides—

(1) Performance of combat engineer tasks and (when reinforced with additional heavy equipment and operators) can accomplish more complex engineer tasks.

(2) Engineer support for combined arms teams of the division.

(3) Performance of infantry combat missions, when required.

b. The combat engineer company is equipped and trained to fulfill its mission by means of providing general and special engineering work. It performs the tactical engineer planning, supervision and execution of engineer combat support at brigade or task force level.

c. The platoon is the principal working element of the combat engineer company. It can operate independently to provide engineer support re-

quired by a battalion task force when it is furnished additional equipment support by its parent company or the battalion.

d. The squad is the basic operating and working unit of the platoon. It consists of specialists in combat construction and demolition and engineer soldiers who are trained in accomplishing combat engineer tasks. In the armored and mechanized divisional engineer battalions, the squad personnel and organic equipment are transported in an armored personnel carrier, in the infantry division engineer battalion the squad personnel and organic equipment are transported in dump trucks. This difference in the squad carrier gives the engineers mobility similar to that of each division.

4-4. Equipment

The major items of equipment in each company are listed in table 4-1.

4-5. Employment

a. The engineer company with organic equipment is designed to provide combat engineer support to a brigade or brigade-size task force engaged in combat operations. It is reinforced with general or special engineer equipment from the headquarters company or bridge company when necessary to increase the effectiveness of the support rendered.

b. The company normally is employed as a unit in a direct support role but it may be attached to a combat unit for separate operations. One reinforced engineer company normally supports each committed brigade or similar size task force.

c. The engineer company supporting a unit in offensive operations should be placed well forward in the tactical column in order that it may be available for essential engineer tasks. A typical disposition would be the engineer platoons, with assault bridging, located immedi-

Table 4-1. Major items of company equipment

Element	Item	Engr Co. Inf Div Engr Bn	Engr Co Mech or Armed Div Engr Bn
CO Hq	Armored personnel carrier (APC) -----		X
	Combat engineer vehicle (CEV) -----	X	X
	Pneumatic tool and air compressor outfit, tlr mtd -----	X	X
	Carpenter tool kit, squad -----	X	X
	Tractor w/semi-U dozer -----	X	X
	Truck, cargo, 2½-ton -----	X	X
	Truck, dump, 5-ton -----	X	X
Plat Hq	Chain saw -----		X
	Electric pioneer tool outfit -----	X	X
	Scoop loader -----	X	X
	Truck, dump, 5-ton -----	X	X
	Carpenter tool kit, platoon -----	X	X
Each Sqd	Pioneer tool kit, platoon -----	X	X
	Demolition equipment set -----	X	X
	Armored personnel carrier -----		X
	Chain saw -----	X	
	Carpenter tool kit, squad -----	X	X
	Pioneer tool kit, squad -----	X	X
	Truck, dump, 5-ton -----	X	
	Demolition equipment set -----	X	X
	Detecting set, mine, metallic -----	X	X

ately to the rear of the leading companies in the task force. The company minus would be located in the vicinity of the brigade or task force command post (CP). The company commander of the engineer company supporting a combat element acts as engineer staff officer for the force commander.

d. Each of the three engineer platoons of the company is capable of performing combat engineer support tasks including earthmoving, demolitions, and pioneering. To support armored operations, the engineer platoon should have vehicles which provide them mobility equivalent to the supported force. When reinforced with the assault bridge and a combat engineer vehicle, the platoon may be used to support armored task forces under fire. When reinforced with a dozer, graders, dump trucks, and an air compressor, the platoon supports defensive operations or performs general engineer works.

e. The platoon usually is employed as a part of the company but it may be given a mission

in direct support of or attached to a battalion-size task force. The platoon leader of the supporting engineer platoon is the engineer staff officer for the supported task force.

f. The squad is designed to function more efficiently as a working component of the platoon although it may, when needed, perform independent missions.

4-6. The Combat Engineer Vehicle (CEV)

The CEV (fig 4-1) is one of the most important items of mission equipment of the combat engineer company.

a. *Capabilities.* The CEV provides engineer troops in the forward combat area an armor-protected means of accomplishing pioneer tasks under hostile fire in support of combat elements. Typical tasks which may be assigned to the CEV are—

(1) Destruction or removal of obstacles by use of the demolition gun, bulldozer, winch, or boom.

(2) Construction of roadblocks and other obstacles by use of the bulldozer, winch, or boom.

(3) Passage of short dry gaps, antitank ditches, and craters by earthfilling using the bulldozer.

(4) Placement of fixed span assault bridging or fascines for passage of short gaps.

(5) Preparation of abutments for the armored vehicle launched bridge (AVLB).

(6) Removal of barbed wire entanglements by dozing.

(7) Construction of approaches for mobile floating assault bridge equipment (MAB) and amphibious vehicles.

(8) Construction of combat roads and trails.

(9) Destruction of strong points in the assault of fortified areas or in combat in built-up areas.

(10) Clearance of rubble and debris in built-up areas.

(11) Construction of tank and gun emplacements.

(12) Launching explosive mine clearing devices in the assault breaching of minefields.

b. *Limitations.* Although the CEV is a heavily armored vehicle and carries a 165-mm demolition

gun, it is designed for use as a combat support vehicle, not as a tank. When employed in forward areas subject to enemy tank or antitank fire, it requires protection by tanks or other antitank weapons. The crew of the CEV is trained to util-

ize the vehicle in combat construction and demolition tasks, not in armor tactics. The CEV should be used only for those combat engineer tasks required to support assault elements.

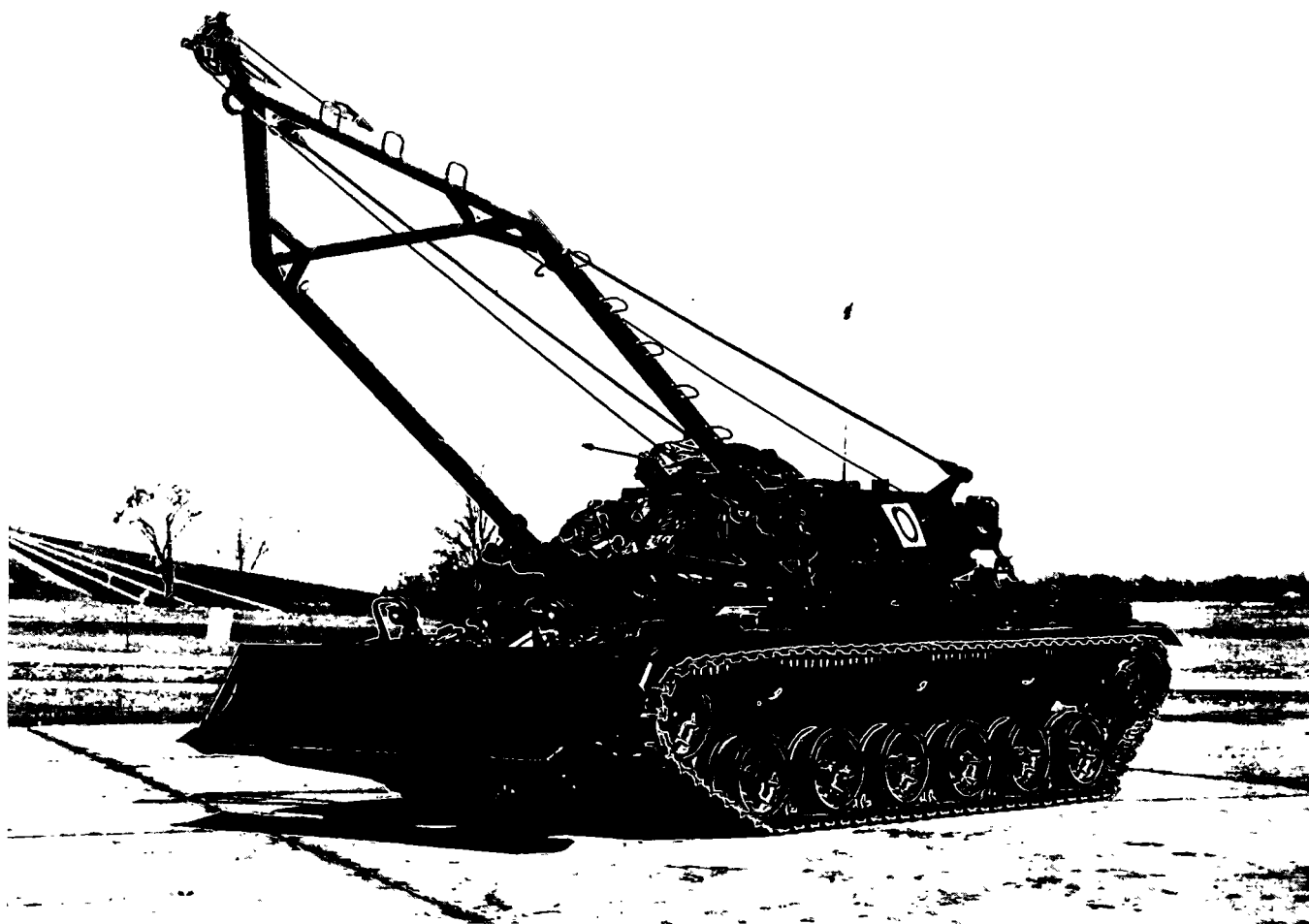


Figure 4-1. Combat engineer vehicle; 3/4 left side view.



CHAPTER 5

BRIDGE COMPANY

5-1. Organization

The bridge company of the divisional engineer battalion is organized under TOE 5-148 and is the same for the armored, mechanized, and infantry divisions. It consists of a company headquarters, and armored vehicle launched bridge (AVLB) platoon, and either two identical heavy raft platoons (mobile floating assault bridge/ferry equipment (MAB)/or two identical bridge platoons (M4T6 or Class 60 bridging) (fig 2-1).

5-2. Mission

The mission of the bridge company of the divisional engineer battalion is to—

a. Provide technical personnel and equipment to load, transport, erect, operate, maintain and disassemble tactical assault stream crossing equipment.

b. Accomplish nontactical independent bridging or ferry missions as required.

5-3. Capabilities

a. Level 1. At TOE Level 1 this unit provides—

(1) When equipped with mobile floating assault bridge heavy equipment (fig 5-1 and 5-2).

(*a*) One 488-ft (148.7 meter) class 60 floating bridge or two 280-ft (85.3 meter) class 60 floating bridges.

(*b*) Four 176-ft (53.6 meter) class 60 ferries.

(2) When equipped with the M4T6 or class 60 bridging equipment: (fig 5-3 and 5-4).

(*a*) Erection of up to 560 ft (170.7 meters) of class 50 M4T6 floating bridge or eight class 50 rafts.

(*b*) Erection of up to 540 ft (164.6 meters) of class 60 floating bridge; or 4 four-float (reinforced) rafts; or 4 five-float rafts; or a combination of bridge and rafts.

(*c*) Bridge components may be used to assemble fixed spans from 15 to 45 feet long with-

out intermediate supports. Fixed spans over 45 feet long can be assembled using trestles or piers as intermediate supports. For details see chapter 10 of TM 5-210.

(3) Armored vehicle launched bridging equipment capable of passing Class 60 loads over wet or dry gaps up to 60 ft (18.3 meters) wide at four simultaneous assault crossings (fig 5-5).

(4) Light stream-crossing equipage to support an infantry battalion in a river crossing when amphibious vehicles cannot be used are not available or river conditions preclude the use of mobile amphibious bridge or ferry vehicles. Equipment includes—

(*a*) Assault boats (18 each) and reconnaissance boats (12 each) to carry one infantry company by waterborne assault.

(*b*) Light tactical bridge equipage with the following options: (fig 5-6).

1. Two class 12 ferries, or

2. One class 12 bridge 103 ft (31.4 meters) long, or

3. Eight potons powered by outboard motors to be used as storm boats for assault crossings of infantry companies.

(5) Effective coordinated defense of the unit's area or installation.

(6) Organizational maintenance for organic vehicles and engineer equipment.

b. Levels 2 and 3. The Levels 2 and 3 columns adapt the TOE for reduced operational capabilities in decrements of 10%, from approximately 90% for Level 2 to 80% for Level 3. At level 3 the armored vehicle launched bridging capability is reduced to two sites and the light tactical bridge equipage is deleted.

5-4. Limitations

This unit is dependent upon the battalion headquarters company for medical support. This unit is not adaptable to a type B organization.

5-5. Allocation, Category and Mobility

a. Allocation. This unit is allocated on the

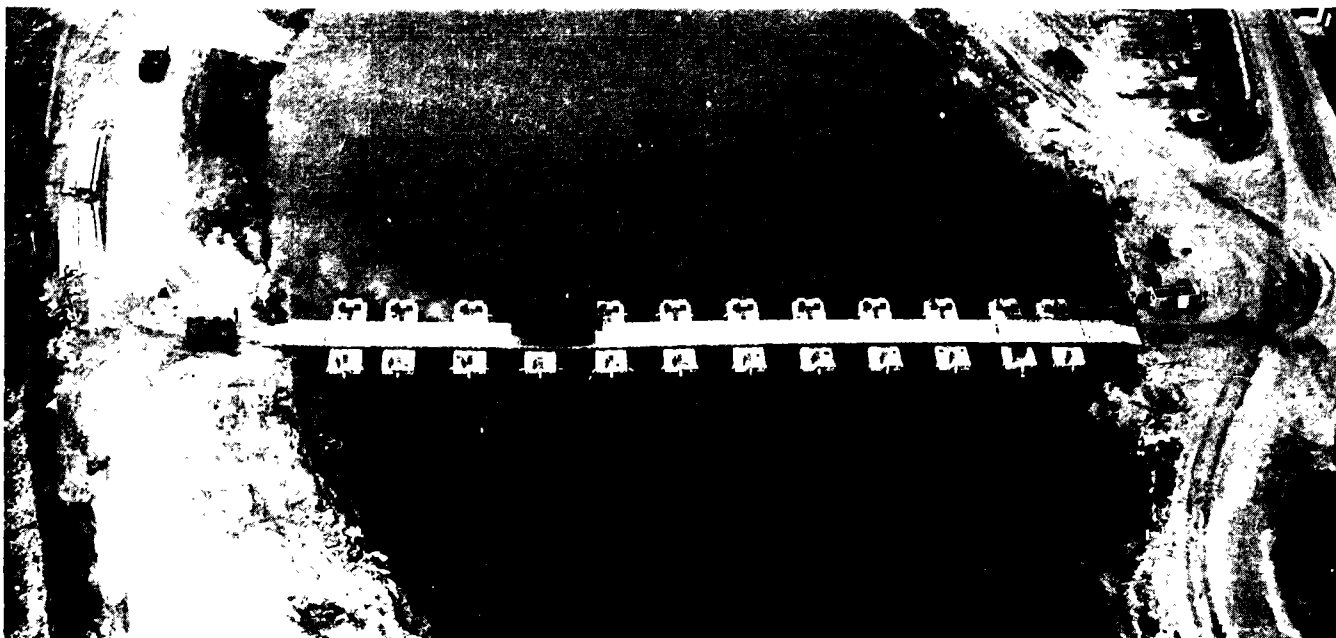


Figure 5-1. Mobile floating assault bridge-ferry (MAB).



Figure 5-2. Load Class 60. MAB ferry.

basis of one per Engineer Battalion Armored Division or Infantry Division (Mechanized) TOE 5-145; or one per Engineer Battalion Infantry Division, TOE 5-155.

b. Category. This unit is designated a category I unit (AR 320-5).

c. Mobility. This unit is 100 percent mobile in organic transportation.

5-6. Equipment

The bridge company contains the major items of equipment listed below :

a. Mobile floating assault bridge/ferry, or floating bridge, M4T6, or floating bridge, class 60.

b. Armored vehicle launched bridges and launchers.

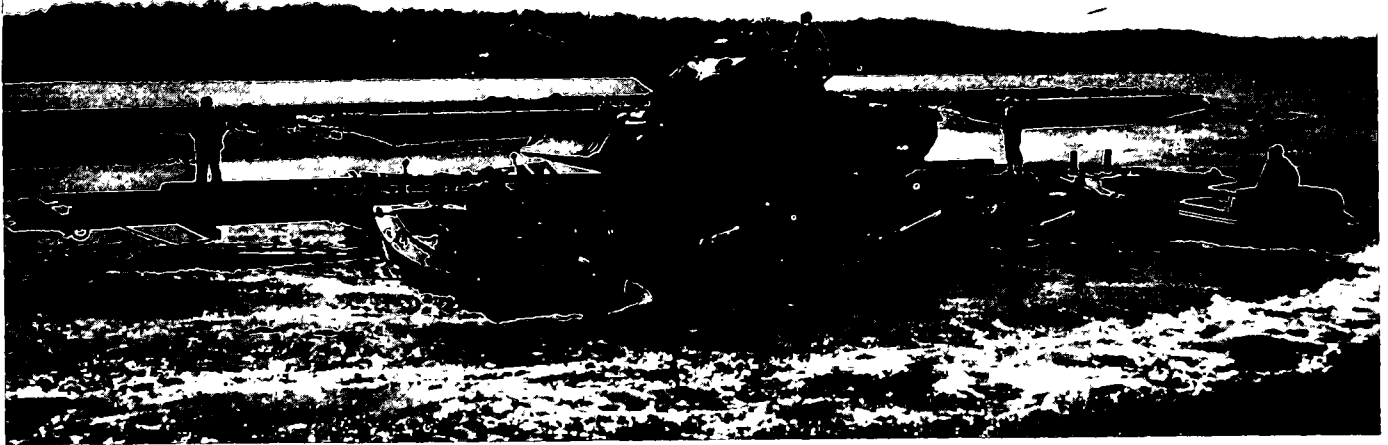


Figure 5-3. Four-float M4T6 (Class 50) raft, propelled by two 27 ft bridge erection boats.



Figure 5-4. Class 60 raft propelled by two 27 ft bridge erection boats.

- | | |
|--|--|
| c. Assault and reconnaissance boats. | i. Radios. |
| d. Light tactical raft floating bridge. | j. Semitrailers, 60- and 25-ton. |
| e. Outboard motors. | k. Bridge trucks, 5-T (when equipped with the M4T6 or class 60 floating bridge). |
| f. Bridge erection boats, when equipped with the M4T6 or the class 60 floating bridge. | l. Truck tractors, 10-T. |
| g. Crane shovel, truck mounted. | m. Cargo trucks, $\frac{3}{4}$ - and $2\frac{1}{2}$ -T. |
| h. Tractor with dozer. | |

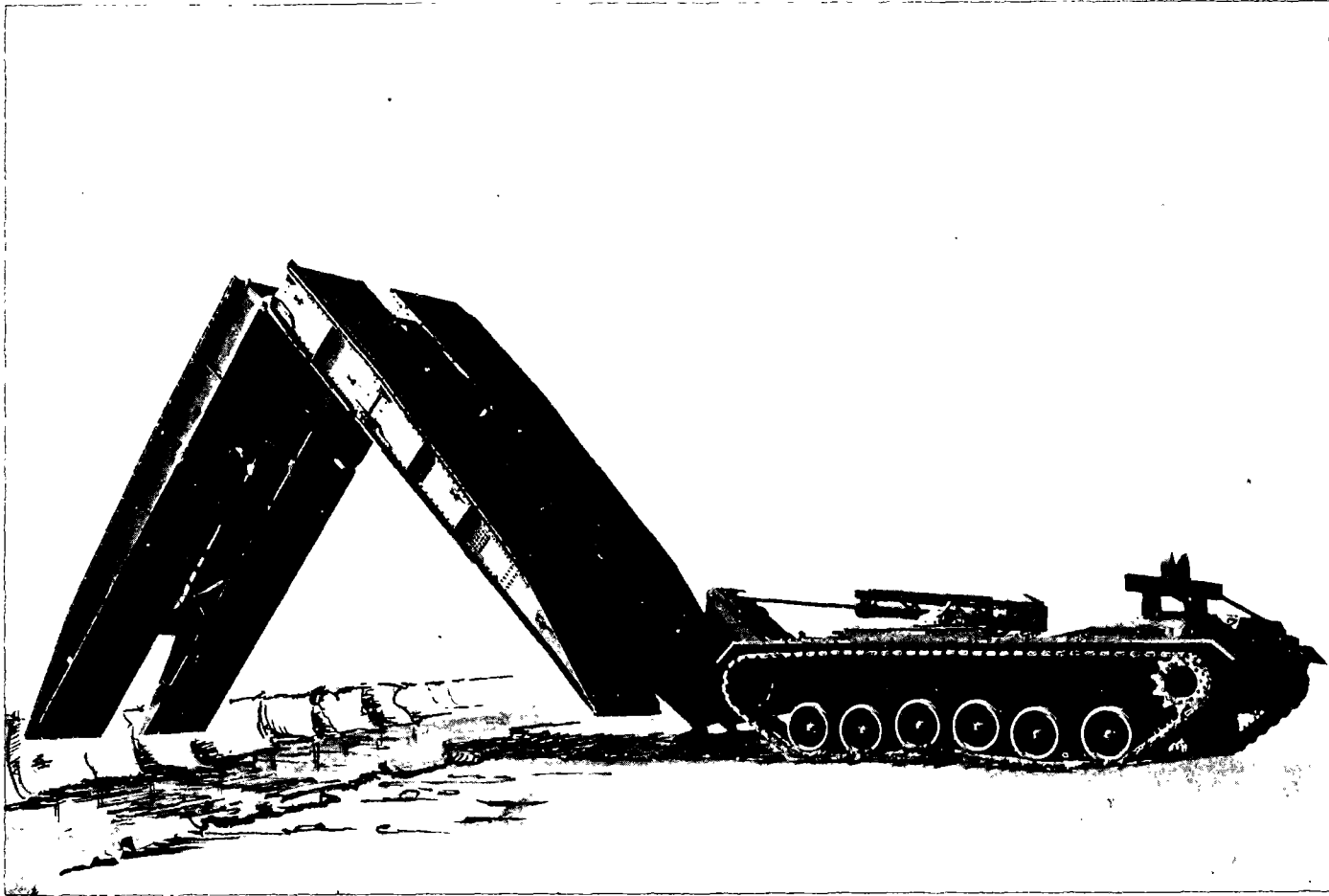


Figure 5-5. Armored vehicle launched bridge being erected.

5-7. Employment

a. General. The engineer bridge company is designed to provide wet and dry gap crossing equipment and technical personnel to the combat engineer companies of the battalion in support of brigade or task force operations. Normally, platoons or sections of platoons are attached to the combat engineer companies. However, gap crossing problems are varied, and each situation requires suitable tailoring of the support element.

b. Employment of the AVLB. In addition to the AVLB's of the engineer battalion, each tank battalion has two bridges and launchers. For details of armor employment of the bridge see FM 17-1. The armored vehicle launched bridge is employed primarily in assault crossings of short gaps by combined arms teams. It is particularly suitable for spanning narrow streams, antitank ditches, craters, canals, partially blown bridges, and similar obstacles which normally would slow the momentum of attack. The AVLB

may be placed over existing bridges or portions of existing bridges to increase the load-carrying capacity of these bridges. It may also be used with components of the class 60 bridge to rapidly construct rafts. In instances where the flank of friendly forces is on a narrow stream or defile, the assault bridge may be used in making a flanking movement. The AVLB should be left in place across the gap only as long as it is needed. It may be left in place to permit the crossing of units following the assault elements, or to provide routes for subsequent logistical or other tactical movement. In this event, an assembled assault bridge from the AVLB platoon is brought forward and placed on the launcher. The launcher then moves to rejoin the supported assault unit. Assault bridging which has been left in place becomes the responsibility of corps or army engineers. The decision to leave the assault bridge in place rests with the crossing force commander, who normally coordinates with the division commander and the division engineer. The division

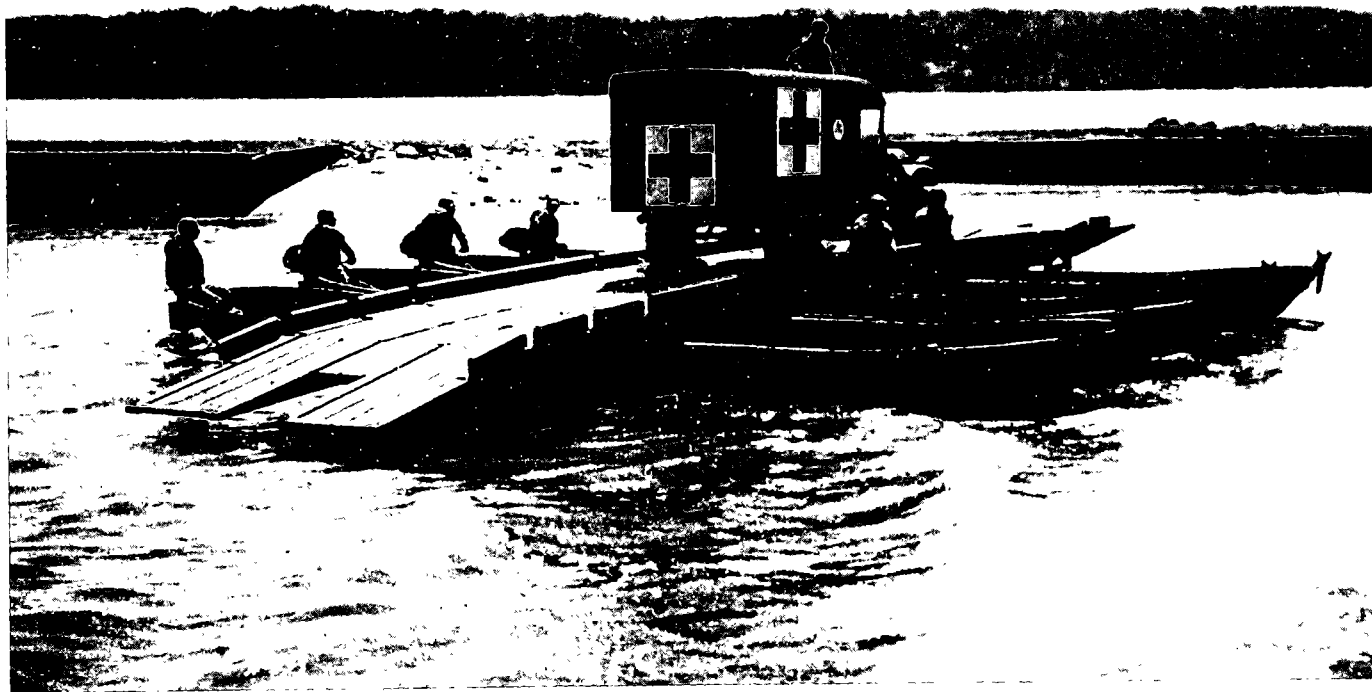


Figure 5-6. Light tactical raft powered by four outboard motors.

engineer arranges transfer of responsibility with appropriate engineer units. Resupply of AVLB'S to the engineer battalion and to tank battalions is the responsibility of the division support command.

c. Employment of Floating Equipage. The divisional engineer battalion can support the river-crossing needs of the division only for small-scale operations. Normally, the division engi-

neers are needed to support the assault units on the far shore. Corps engineer units attached to, or in support of the division construct and operate the necessary heavy vehicular bridges and rafts. The divisional bridge company's floating equipage normally is used in the assault and division engineers are given riverline missions which would release them as soon as possible to their normal far shore tasks.



CHAPTER 6

OFFENSIVE OPERATIONS

Section I. INTRODUCTION

6-1. The Engineers in the Offensive

a. This chapter provides guidance for employment of the divisional engineer battalion and attached engineer units in support of offensive combat. The engineer battalions organic to the infantry, mechanized, and armored divisions operate in like fashion modified by the nature and activities of the combat forces of which they are a part. Engineer units may be placed in direct support of, or may be attached to, brigades or task forces in the offense. When early commitment of the reserve is anticipated, appropriate engineer support must be provided.

b. Because of the varied combinations within each division of tank-heavy, infantry-heavy, or balanced brigades, elements of the engineer battalion must be tailored to best support each brigade or task force. This tailoring is dependent on the mission, actual or potential obstacles, and composition of the combat element.

c. Offensive operations are those undertaken to carry the battle to the enemy. The purpose of the offense is to destroy enemy forces, to deprive the enemy of required resources, to secure territory or terrain, to develop enemy dispositions, or to divert the enemy's attention from other areas. The basic forms of maneuver are the penetration, the frontal attack and the envelopment. A double envelopment and turning movement are variations of the envelopment. The distinction in the division form of maneuver exists primarily in the intent of the division commander since the subordinate elements of the division may use all the forms of maneuver in the attack. Infiltration is a technique of movement used in conjunction with the several forms of maneuver. The exploitation is an offensive operation which may follow a successful penetration or envelopment. The pursuit is an extension of a successful exploitation.

d. A movement to contact may be required to

place the division in position to close with the enemy. It may take place during the period between the loss of enemy contact and the time it is regained (as in a pursuit or exploitation) or when the division moves from a rear area to engage the enemy.

e. An additional objective of the friendly force during the advance is to gain an advantage over the enemy that will facilitate future operations. Maximum advantage of position at the time of contact is achieved by properly organizing the force for combat and maneuvering the force components. During the advance the division commander distributes his forces to provide maximum speed and control consistent with adequate security. The movement to contact is conducted generally on a broad front, usually in multiple columns. The advance is pushed forward aggressively to gain the advantage before the enemy can react.

f. The movement to contact terminates when major enemy resistance requires the deployment and coordinated effort of the division. For additional details on the movement to contact, see FM 61-100.

g. The coordinated attack of the division is characterized by fire and maneuver, which are combined and controlled to create a preponderance of combat power that culminates in a powerful and violent assault in the decisive area.

h. Once the attack is launched, the division attempts to gain its objective in the shortest possible time. To insure rapid execution, the commander exploits all means of combat power.

6-2. Engineer Effort, Assistance, and Control

a. Economy of Engineer Effort. There are seldom enough engineer troops available to provide all the engineer effort necessary to assist the ad-

vance of the combat arms and their supporting elements. To insure that maximum engineer effort is available for those tasks which require engineer skills and equipment, troops of combat arms and services participate as required in such pioneer tasks as—

- (1) Expedients for stream crossings.
- (2) Preparation of protective obstacles and deception devices.
- (3) Minefield laying and breaching.
- (4) Expedient road and culvert repair.
- (5) Execution of camouflage projects.
- (6) Reduction of obstacles.
- (7) Control of fires in forested or built-up areas.

b. Typical Engineer Tasks. The division engineer recommends the disposition of engineer troops for each operation. Such disposition normally is made by assigning engineers specific tasks such as—

- (1) Conducting engineer reconnaissance.
- (2) Locating, marking, and removing mines.
- (3) Assisting forward movement of the combat arms and supporting elements by repairing roads, removing obstacles, and helping them cross gaps, streams, rivers, and passage through defiles.
- (4) Constructing airlanding facilities for troop movements, supply and evacuation.
- (5) Opening and improving roads, trails, bridges, and fords for troop movement, supply and evacuation.
- (6) Providing route information necessary for the preparation of traffic circulation plans and implementing engineer requirements developed by the plans.
- (7) Assisting in flank security through the use of demolitions, minefields, and obstacles.
- (8) Providing engineer intelligence data.
- (9) Providing potable water.

c. Assistance to Divisional Engineers. The corps commander allocates support to the division, including engineer units, based upon the overall corps mission and situation. At the beginning of an offensive operation, a corps engineer combat group may assume some of the divisional engineer battalion's responsibilities in the division rear area, progressively extending its work

line forward to relieve the divisional battalion. Elements of a corps engineer combat group or the entire group may be attached to a division for an operation requiring an unusual amount of engineer support; for example, a river crossing. The attached engineer units return to the control of the parent unit at the conclusion of the operation. In a major attack, the corps engineer combat group may designate one or more of its combat battalions as direct support battalions, operating with the division and often in the same areas as elements of the divisional engineer battalion. Such units remain under group control. Except for special operations, it is desirable for corps engineer units, under parent unit control, to support the division on an area basis. Boundaries between the divisional and corps engineer units are established informally to denote the forward working limit of the supporting engineer unit. Such working limits eliminate unnecessary concentration of nondivisional troops in forward areas. Specific missions forward of a working limit, such as bridge or road construction and maintenance, are made on a task basis. The size of the engineer elements attached or supporting is governed by the anticipated strength necessary to reduce obstacles and to support the advance of the attacking forces. When necessary, nondivisional engineers may be further attached to brigades. The commander of the divisional engineer battalion is the division engineer and directs the engineer work in the division area.

d. Control. It is essential that the engineers be in close contact with the committed units. Proximity enables them to anticipate the needs of the attacking troops, and to have engineer support available for meeting those needs promptly. The division engineer recommends the disposition of engineer troops and equipment for all phases of the offensive operation and recommends appropriate changes in disposition as needed. Liaison between supporting and supported units and between adjacent units during the attack assures cooperation and coordination among all units participating in the operation. It is the responsibility of the supporting units to establish and maintain liaison with the supported organization. Liaison between adjacent units is established as directed by the senior commander—usually each unit is charged with maintaining liaison with the unit to the right. The assistant division engineer is the chief liaison agent between the engineer battalion and division headquarters. Liaison functions between the

supporting combat engineer company and a brigade are performed by personnel designated by the company commander, usually the company executive officer. The liaison officer is familiar with the capabilities and operations of both units and keeps himself informed on all plans and oper-

ations to give reliable and up-to-date information and advice to both commanders. If a further breakdown of engineer elements is necessary, liaison is established with their supported organizations.

Section II. MOVEMENT TO CONTACT AND ATTACK

6-3. Engineers in the Movement To Contact

a. General. A division moving to contact in an independent operation normally is organized into a covering force, an advance guard, a main body, and security forces. As a general rule, a division does not conduct offensive operations alone, but participates as a part of a larger force. In these cases, in a movement to contact, the larger force provides and controls the covering force.

(1) The mission assigned the covering force is to develop the enemy situation and prevent unnecessary delay of the main body. It accomplishes its mission well forward of the main body.

(2) The advance guard maintains contact between the main body and the covering force and expedites movements of the main body.

(3) Units of the main body are organized for combat and positioned to permit maximum flexibility for employment during the advance and after contact is established. Each column of the main body is responsible for its own security.

(4) Flank and rear security forces protect the main body from ground observation and surprise attack.

(5) The division engineer recommends disposition of available engineer troops and equipment (fig 6-1 and 6-2) based on the scheme of maneuver announced by the division commander. He recommends appropriate changes in disposition as the need arises. Engineers may be used in the advance guard and in the flank and rear security forces as well as in the main body. If the engineer battalion is unable to perform all the engineer work required, the division commander may request reinforcements. In this case, additional engineer units are placed in support of the divisional engineer battalion by corps or army.

b. Specific Engineer Duties. During the movement to contact, speed is essential. Maximum use of existing road nets and avenues of approach is emphasized. Early securing of critical terrain is

also important. Nuclear fires, including atomic demolition munitions, (ADM), which is an engineer responsibility, may be used in conjunction with other nuclear fires to provide added security by blocking enemy avenues of approach. Other engineer duties in the advance include conducting reconnaissance; opening and improving roads, trails, and bridges for troop movement, supply and evacuation; reducing obstacles; assisting in the passage of defiles; and constructing bypasses.

c. Reconnaissance During the Movement to Contact. Engineer reconnaissance during the movement to contact is performed initially by reconnaissance teams from battalion headquarters who often accompany armored cavalry security and reconnaissance units. These teams provide the division engineer with early, reliable engineer intelligence of the area over which the division is to advance. Routes of advance are thoroughly examined for serviceability, type, condition, location of critical points, alternate routes, mines, and condition and types of bridges. Route information is forwarded to higher headquarters as it becomes available. The reconnaissance teams make an estimate of engineer tasks and of engineer materials available. Estimates of tasks to be completed and time factors are continuously forwarded to highway traffic headquarters. The on-the-ground reconnaissance must be supplemented by air reconnaissance, map and aerial photograph studies, and study of reconnaissance from other elements of the command. It is essential that this reconnaissance is made prior to the movement, since the information gained provides a basis for the estimate of engineer troops, supplies, and equipment necessary to support the operation and for the selection of routes and the formation of traffic circulation and traffic control plans. Engineer reconnaissance elements from an engineer company may accompany the advance party of each leading brigade to provide timely alert of engineer requirements. Terrain which appears favorable to the advance

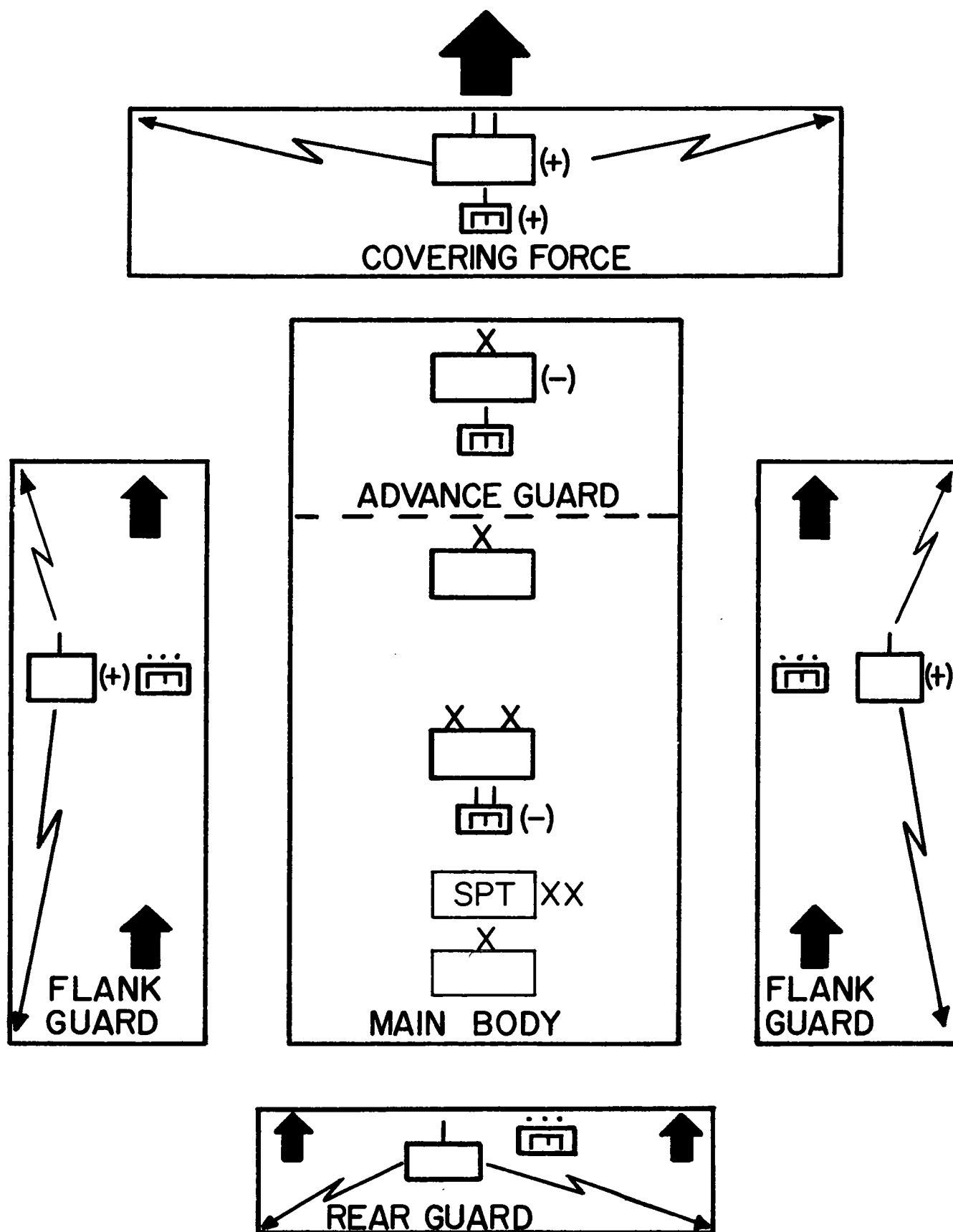


Figure 6-1. Engineer battalion disposition for movement to contact of a division operating alone.

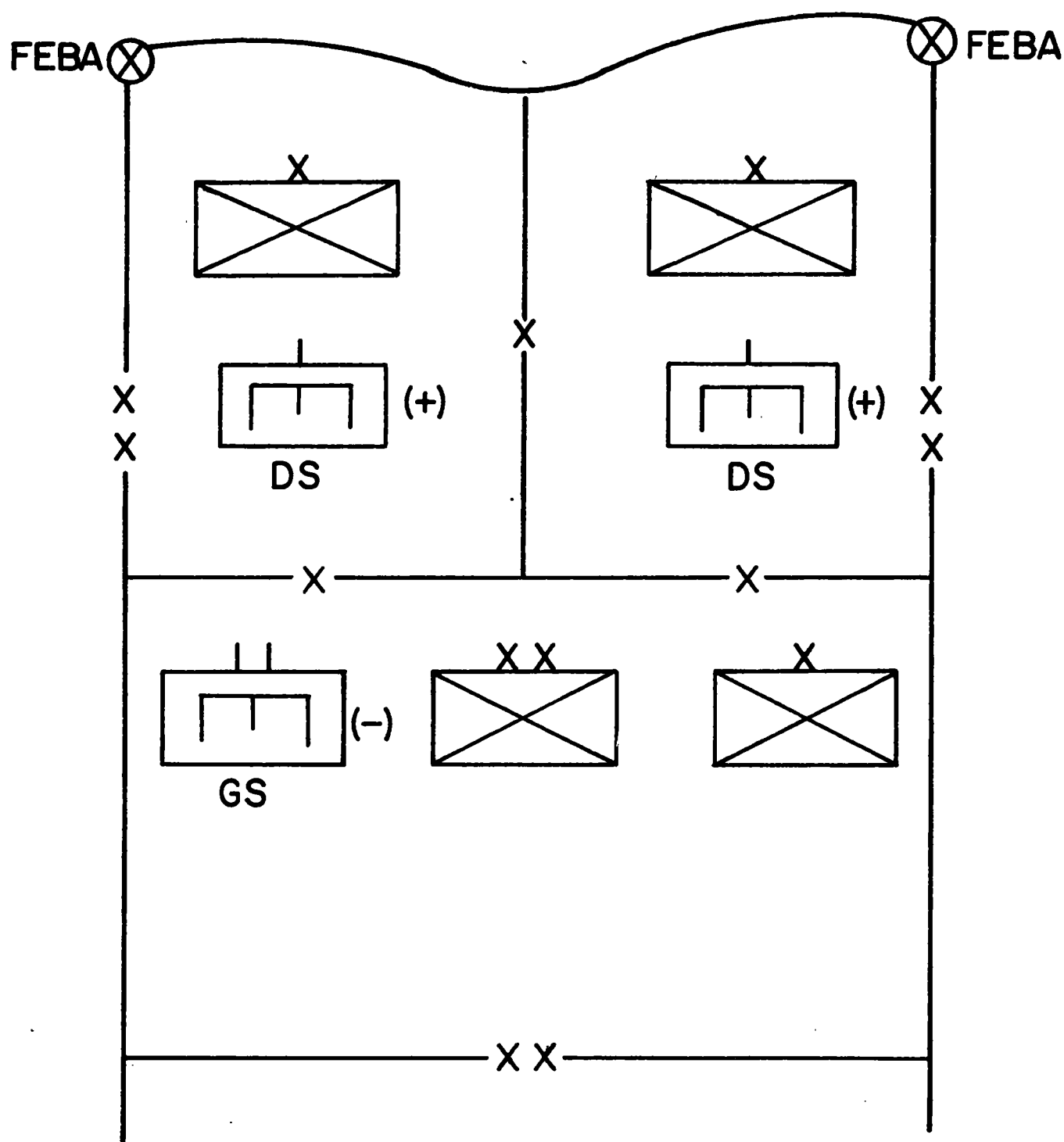


Figure 6-2. Engineer battalion disposition in the attack; infantry division.

is closely examined, especially for possible enemy use of mines, obstacles, and defending weapons.

d. Covering Forces. Missions assigned to a covering force are broad in nature and may include developing the enemy situation, attacking

to destroy enemy resistance, securing and holding critical terrain, or containing large enemy units. Engineer support in a covering force (to include engineer reconnaissance teams) should be located well forward to aid the movement of

armor, artillery, and essential infantry support. When a brigade is operating as the division covering force, it usually has an engineer company and an assault bridge element attached. Obstacles which cannot be bypassed are breached or surmounted. The type of obstacle, the time, and the equipment available determine the method employed. Breaching usually involves removal or destruction by demolition. Surmounting an obstacle may require bridging or ramps. The location of the passage(s) is determined by the tactical plan, terrain, enemy position, and the extent of the obstacles. Road gaps which cannot be bypassed are hastily repaired or bridged. While conducting these tasks the engineers are armed with their individual and crew-served weapons to resist enemy interference. Operation of the passage is passed to military police as early as possible to relieve engineers for their primary mission.

e. Advance Guard. The main force advances behind the covering force. Each column is preceded by its own advance guard which furnishes protection from ground observation and surprise from the front, and provides the time and space necessary to enable the main body to deploy for combat. Each advance guard is supported by engineer troops and reconnaissance elements, whose commander is the staff engineer for the advance guard. During the advance of a brigade, elements or all of its supporting engineer company normally form a part of the advance guard. When these engineers are on foot, they are supported by mounted engineer troops with tools and equipment, following by bounds, or they are equipped with mechanical clearing equipment compatible with the advance of foot troops. The point engineers normally have mine detectors and probes. They search for and mark or open a lane through an enemy minefield. (Complete clearing is undertaken after the combat units have moved through and there is less urgency). Within their capabilities, the advance guard engineers remove all obstacles which have been left or only partially breached by the covering force. Removal or breaching of complex obstacles may require additional engineer troops and equipment which are moved forward from the element in support or reserve. The advance guard engineers maintain contact with the point. The remainder of the engineers with the advance guard, with tools, transportation, and equipment, move with the support or reserve, and leave work parties at vital points where the need for engi-

neer assistance exists or is anticipated. These parties rejoin their units on completing their tasks. The advance guard engineers may thus be depleted at the end of the march, and it may be necessary to renew their strength by substituting new units from the engineers with the main body. When the main force is not preceded by a covering force, the advance guard normally is stronger, with a corresponding increase in the strength of the engineer support.

f. Flank and Rear Security Forces. Flank and security forces protect the main body from ground observation and surprise attack. Engineers support the flank and rear security forces by being prepared to assist in the blocking of avenues of approach through the creation of obstacles such as craters, contaminated areas, minefields, demolished bridges, and floods.

g. Main Body. The main body contains the bulk of the advancing force's combat power. It is immediately available to attack the main enemy force and secure the objective. Supporting engineer troops are so positioned in the advancing columns of the main body as to permit maximum flexibility and communication with the security elements. They are available for employment during the advance to reinforce or replace the advance guard engineers or the flank and rear guard engineers.

6-4. Engineers in the Attack

a. Specific Engineer Duties. The duties of the engineers in the attack resemble those in the movement to contact (para 6-3b). As the attack develops, however, new demands for engineer support arise. Reconnaissance is required both before and during the attack, especially of the main supply route and other routes of advance, and of enemy obstacles and barriers. Specialized assistance from engineers may be needed to bypass, breach, or remove obstacles; assault fortified positions; establish flank protection; or organize captured ground against counterattacks. Upon gaining control of an area, the construction of advance landing facilities for the division's aircraft will be required. Site selection for these landing facilities is of vital importance to the engineer commander, as he must evaluate each potential site in the light of anticipated engineer effort, materials, and construction-time requirements. Water points may have to be established over a wide area because of the dispersion of the attacking units. Water points are normally

attached to the engineer company supporting the brigade and must be as mobile as the units for security of water points must be made. Routes of advance for combat troops and essential supplies are established and maintained.

b. Reconnaissance in the Attack. During the attack, the reconnaissance teams from engineer battalion headquarters continue their general reconnaissance, closely following the forward engineer companies. They pay special attention to the routes of advance. When necessary, personal

reconnaissance is made by the commander. Engineer companies attached to, or in support of, brigades make continuous reconnaissance of routes of advance, particularly the main supply route, obstacles, mines, potential water points, and sources of engineer materials in their assigned area. Special reconnaissance missions are assigned by the battalion S2. On the basis of this reconnaissance information, engineer operational plans are made and means are provided to assist in maintaining the momentum of the attack.

Section III. RIVER CROSSINGS

6-5. Basic Considerations

a. Purpose. The purpose of a river-crossing operation is to move the attacking force across the river obstacle as rapidly and as efficiently as possible so that it may either continue its attack to destroy the enemy or secure assigned objectives which will protect the crossing of the remainder of the force. In its broad aspects, a river-crossing operation includes—

- (1) Advance to the river.
- (2) Final preparation for crossing.
- (3) The assault.
- (4) Advance on the far side of the river.
- (5) Securing of the bridgehead.

b. Responsibilities. A river crossing is the tactical commander's responsibility, but the division engineer plans continuously for the support of division river crossings in the offensive. For major crossings, the division must be supported by corps and army troops, and the division engineer makes his requirements for support known as early as possible to the corps engineer. In establishing those requirements, the division engineer maintains close liaison with G3 on plans, exploits all sources of intelligence to determine what may be needed, and performs constant reconnaissance to specifically determine the requirements. Engineer tasks in the crossing include guiding the assault echelon from the assembly area (attack positions) to the crossing site, (when assault boats are required) operating assault boats, assembling and operating rafts, assembling and maintaining footbridges and heavy vehicular bridges, removing mines, constructing approach roads, and exits. Plans for crossing a stream over which the enemy has destroyed all bridges must consider the strength

with which the enemy holds the opposite bank and the characteristics of the river. If airdropped or airlanded forces are included in a river-crossing operation, timing of their portion of the operation must be coordinated with timing of the assault forces crossing the river. A river crossing operation can be supported by attack helicopters. During the advance to the river and final preparations for river crossing, attack helicopters may be used to control key terrain and deny the enemy close observation or to assist in adjustment of indirect fire support; during the assault and advance on the enemy side of the river, attack helicopters provide the full spectrum of direct aerial fire support to include the antiarmor and reconnaissance by fire capability.

c. Methods of Crossing. When the area through which the division will attack contains an unfordable river, plans must include provisions to cross without loss of momentum or significant concentration on either bank. The river is approached at maximum speed on a broad front. All existing bridges in the zone of advance are objectives and every attempt should be made to secure these intact. However, success of the division plan for crossing the river is not predicated on the securing of bridges intact. If bridges cannot be secured intact, a hasty crossing is made on a wide front capitalizing on organic assault bridging, amphibian characteristics of armored carriers, organic airlift capability, nuclear fires, chemical munitions, and improvised means. Particularly under nuclear conditions, the hasty crossing offers the greatest advantages and should be sought whenever possible. The deliberate crossing is conducted only when a hasty crossing has failed when a hasty crossing is infeasible because of the difficulty of the obstacle

or the strength of enemy defenses, or when an offensive is resumed at a river line. The success of either type crossing will depend on the thoroughness of prior planning and the commander's application of sound tactical principles.

6-6. Hasty River Crossing

A hasty river crossing must be boldly executed to gain surprise, to prevent the organization or strengthening of defenses, and if possible to secure an existing bridge or other crossing means. Use of Air Force and Army aircraft are of vital importance in a hasty crossing. Advance elements are crossed by any means available. The one overriding consideration is that the momentum of the advance of the division must be maintained. Aggressive action sometimes results in the capture of a bridge before the enemy has destroyed it. At other times, a damaged bridge can be repaired, but in most cases military bridging or rafts will be necessary to cross tanks, artillery, other equipment, and supplies. Amphibious vehicles may be used to carry personnel and supplies where there are no bridges, or to supplement the carrying capacity of the available rafts and bridges. Hasty crossings must be anticipated, and all available river crossing equipment must be well forward and used promptly. Speed, surprise, and decentralization of control of specific crossing times of subordinate forces characterize the hasty crossing. However, traffic control is essential to insure maximum use of crossing means.

6-7. Deliberate River Crossing

A deliberate river crossing is a planned river-crossing operation which requires a buildup of the required force and crossing means to overcome the barrier and enemy defense of the far shore. Detailed planning, extensive logistical preparation, and air and ground superiority are required. Planning for a river crossing operation may be done at all echelons of command. Long-range planning is done by corps and higher echelons; short range and current, detailed planning is done by corps, division, brigade, and lower echelons. The division normally conducts a deliberate river crossing utilizing its engineers in the assault phase. The divisional engineers have the primary mission of supporting the assault units during the assault phase by breaching obstacles, operating boats, preparing entrances and exits for vehicles, and aiding fording and swimming vehicles. The engineer battalions of the divisions not committed in a deliberate

crossing are normally held to provide engineer support when the divisions are committed on the far shore. Attached or supporting corps and army engineers usually are responsible for constructing rafts and bridges. Engineer amphibious forces, if available, provide amphibious assault landing vehicles and increase the combat support capabilities on the far shore. Normally, before the assault, attached or supporting engineers are assisted by elements of the committed division's engineers in such tasks as performing preliminary work on bridge approaches or access roads, and breaching obstacles. Elements of equipment and bridge units usually are attached to the engineer companies supporting the assaulting forces for use in establishing the bridgehead and for use in support operations on and beyond the far shore. Extensive operations require backup support from corps or army in the form of additional engineer units with fixed, floating, and assault bridging equipment. FM 31-60 discusses in greater detail the operational planning and execution involved in river crossing operations.

6-8. Crossing Means

All available crossing means are used to cross the maximum number of troops and equipment in the shortest time. The amphibious vehicle such as the landing vehicle, tracked, personnel (LVTP), the armored personnel carrier, and the helicopter are three important means of getting personnel and supplies across the river. When necessary, the divisional engineer battalion constructs rafts, mobile assault or float bridges, and expedient bridges. These are used to cross tanks (where fording is impractical), additional personnel, ammunition, heavy weapons, equipment, and necessary vehicles to support the bridgehead. Mobile assault ferries and bridging will be replaced by floating or fixed bridging as soon as possible to permit the divisional bridge company to retrieve the MAB and continue to support the division. If the bridge company is equipped with the M4T6 or class 60 floating bridge, the bridging normally is left in place, and the divisional bridge company immediately obtains replacement bridging from the nearest supply source. Infrequently the floating bridging may be disassembled by one of the engineer companies or the bridge company and reloaded on the bridge trucks, which return to the supported organization for the next bridging operation. For a detailed discussion of river-crossing equipment, and site selecting, see TM 5-210 and FM 31-60.

6-9. Traffic Movement and Control

a. Traffic regulation and control plans govern the ground and water movement of troops, equipment, and supplies throughout the river-crossing operation. Their purpose is to expedite the crossing of vehicles and minimize congestion to reduce vulnerability to enemy fires.

b. The G3 has general staff responsibility for insuring that the tactical forces move across the river obstacle at the designated crossing site and at the required time.

c. Traffic control planning is a general staff responsibility of the G4 and is closely coordinated with the G3 whose tactical requirements have priority. Traffic control planning is also closely coordinated with the provost marshal, the signal officer, the transportation officer, the division engineer, and corps engineer liaison personnel. The primary means of controlling the movement of forces, except the assault elements, is the traffic circulation and control plan. Although this plan

concerns the movement of all vehicles, it primarily provides for the expeditious routing of combat support and combat service support traffic.

d. An engineer element exerts technical control at an engineer regulating point (ERP) to insure proper use of the river-crossing means, to include—

(1) Examination of vehicles to detect improper loading with respect to technique, weight, or dimensions.

(2) Recommendation for rerouting or halting of certain traffic when technical difficulties make one or more of the crossing means inoperable, or curtail its carrying capacity.

(3) Assistance to the division traffic headquarters in maintaining maximum safe traffic density.

(4) Provision of the correct classification of each crossing means to the division traffic headquarters.

Section IV. GAPS AND DEFILES

6-10. Gap Crossing

a. *Types of Gaps.* Gaps found in the combat zone include antitank ditches, road craters, narrow streams, canals, washouts, ravines, railroad cuts, and other similar obstacles.

b. *Gap Crossing Equipment.* The armored vehicle launched bridges are used to cross short gaps in a minimum of time and with minimum exposure of bridging personnel to enemy fire. They are highly mobile and capable of quick erection so that the crossing of forward combat elements may be made rapidly. Components of light tactical raft set, the M4T6 bridge, or the class 60 bridge may be used to construct fixed bridging to cross gaps of various widths. See TM 5-210 for types and classes.

c. Gaps may often be spanned rapidly and economically with expedient methods employing demolitions, nonstandard bridging materials, or earth-fills emplaced by dozers or CEV's.

6-11. Passage of Defiles

a. *Identification of Defiles.* A defile is any terrain feature, natural or artificial, that tends to constrict the passage of troops. A mountain pass, a gap through a minefield, a river-crossing site, a bridge, narrow gap between two radioactive areas are examples of defiles. Major forces passing through a defile are particularly vulnerable to air and nuclear attack.

b. *Engineer Employment.* All routes must be reconnoitered and made suitable for the anticipated volume of traffic. In planning for passage of a defile, alternate routes must be designated. Selected routes should take advantage of concealed approaches to and through the target zone. Passage should not be planned to depend exclusively on the use of roads. Adequate deception measures must be planned to further the success of the defile passage operation. Dummy equipment should be placed in selected sites to deceive the enemy. Engineer support required to prepare the defile site for passage should be accomplished under conditions of reduced visibility or at night when practicable.

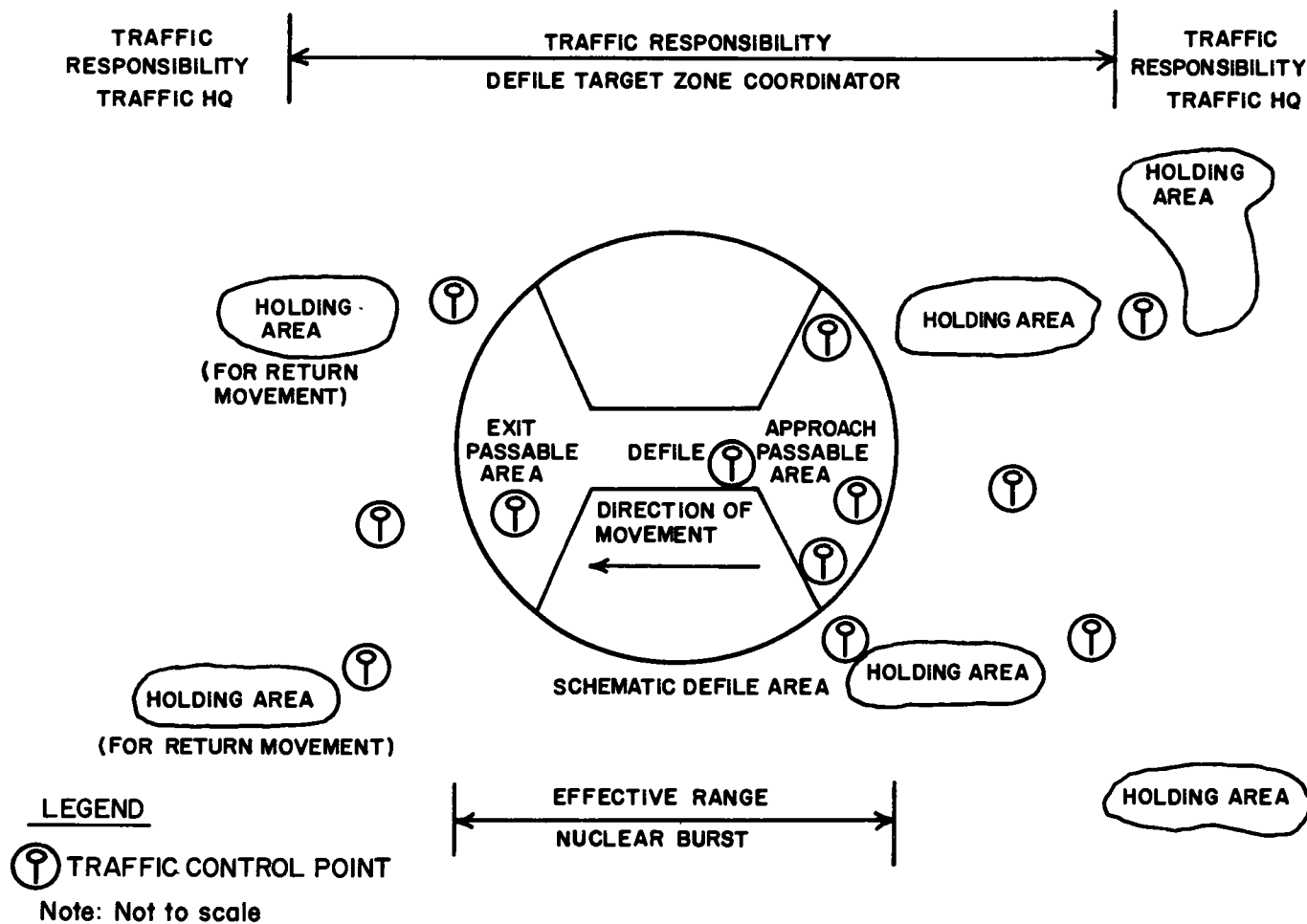


Figure 6-3. Control measures in passage of a defile.

Section V. FORTIFIED POSITIONS

6-12. Introduction

A fortified area is one containing numerous defensive works. Depending on the time and resources available for construction, defensive works may range in complexity from simple positions hastily prepared from locally available material to large permanent type works in organized and integrated belts or zones. The localities and defensive works usually are disposed in great depth and width and in such a manner as to be mutually supporting. Contaminated areas may be used in conjunction with these defensive works. A primary purpose of a fortified area is to cause the attacker to mass and present a profitable target. All commanders must recognize this danger. Whenever possible, fortified positions are contained by minimum forces while the main

force bypasses them and continues the advance to secure more distant and decisive objectives. If the fortified area is assaulted, reserves follow closely behind the assault echelon to exploit the penetration, maintain the continuity of the attack, or defend critical areas against counterattack. Reduction of a fortified area may include a siege or an attack from the rear. Airborne forces may be used in conjunction with other attacks of the fortified area principally to block the movement of large enemy reserve forces and to attack the fortifications from the rear. Unless required for use by the attacker, captured enemy armament and fortifications are moved or destroyed to prevent their use if recaptured. Detailed characteristics of fortified areas and techniques of combat in them are contained in FM 31-50.

6-13. Engineer Support

Engineer support in an assault of a fortified position is fundamentally an application of the same techniques used for breaching any other obstacle of magnitude. In this instance, however, engineer units are used in conjunction with a reinforced infantry platoon as the basic assault unit. During the attack, the principal mission of the engineer is the breaching of the outer and larger obstacles which protect the main fortified position. Specially organized and equipped infantry squads are charged with the reduction of weapons emplacements, bunkers, and pillboxes, and the clearing of close-in and minor obstacles. Close coordination is essential between those engineers breaching the line of obstacles and those infantry squads reducing the fortifications. After the fortified line has been breached, the primary engineer task is the creation and maintenance of routes to and through the gaps, with a secondary mission of destroying, by demolition, the captured forts or pillboxes. As the assaulting troops break through or envelop the enemy position, engineers overcome the remaining enemy obstacles. Immediate exploitation of success is imperative. If the position is organized in depth, the attack or new attack, constituted by another combined arms team, must proceed to the second line for fortifications as soon as possible. The same techniques are used in reducing a second line as in the case of the first line. Assault units normally are organized into task groups for specific functions. Groups may be formed for the following tasks:

- a. Clearance of antipersonnel mines in advance of breaching personnel.
- b. Breaching or otherwise neutralizing an obstacle.
- c. Marking lanes and gaps after the breakthrough.
- d. Providing local security.
- e. Laying smokescreens to conceal operations of the group.
- f. Standing by as a contingent to replace or reinforce.

6-14. Reconnaissance

Detailed intelligence is required upon which to base training, rehearsals, and plans. Before the attack begins, a preliminary engineer study is made of the terrain, bridges, routes of communication, and artificial obstacles such as minefields,

tank traps, and emplacements. The techniques of attack and the requirements for engineer breaching personnel, supplies and subsequent reconstruction are based on this study. Information for the study may come from various sources, of which ground reconnaissance is the most satisfactory. For areas beyond the reach of ground reconnaissance parties, information must come from aerial photographs and other sources. Ground reconnaissance before the attack should, if possible, cover obstacles in front of and on the flanks of the enemy position. Minefields are reconnoitered to determine their boundaries, types of mines; the presence of gaps in the field and whether and how they are marked; possible detours and approaches; and the location of defending weapons and chemical and radiological contaminated areas. The reconnaissance parties seek to determine the positions of the obstacles which are best adapted for clearing operations, either because of their weakness or because they are not well covered by fire. Normally, reconnaissance is done by the troops who are to breach the obstacles. Parties are given definite routes and areas; carefully instructed in their duties; and when possible, rehearsed; and must operate in a manner which will not compromise planned operations. Personnel are briefed on all available information.

6-15. Assault Methods

The area selected for penetration must be isolated. Nuclear fires are particularly well suited to this task. Smoke isolates individual strongpoints from the observed fires of other fortifications. Indirect fire weapons destroy camouflage, neutralize and destroy enemy field fortifications and artillery, fire on enemy counterattacks, and screen the movement of assault troops. When reducing field fortifications by the use of explosives, the techniques employed are essentially the same as those employed in the reduction of concrete walls. Nuclear weapons facilitate the destruction and neutralization of fortified areas. Nuclear bursts can create gaps in the fortified area or isolate sections of it. The resulting radiological contamination, however, must be eliminated, or materially reduced, if friendly forces are to occupy or pass through the area. When authorized toxic chemical agents or flame may be employed to neutralize a fortified area or to isolate sections of it. Combat engineer vehicles and self-propelled flame throwers are used to great advantage against fortified positions. Bulldozers are effective

in the surmounting or bridging of obstacles, and for constructing and maintaining routes into and through the gaps. Other engineer equipment can be used to clear rubble and debris resulting from

the demolition of fortifications. If all captured fortifications must be made unusable, bulldozers can move earth into the entrances of the captured fortifications instead of demolishing them.

Section VI. INTELLIGENCE

6-16. Reconnaissance and Counter-reconnaissance

a. Engineer Reconnaissance. The collection of engineer information is a requirement for all elements in an offensive operation. It is as continuous and detailed as conditions permit and is performed throughout the operation. Details on engineer reconnaissance in the movement to contact are contained in paragraph 6-3c; in the attack, in paragraph 6-4b.

b. Counterreconnaissance. Counterreconnaissance operations are measures taken to prevent or reduce the effectiveness of hostile observation of a force, an area, or an installation, and are supplemented by counterintelligence measures. Engineers contribute to these operations by installing camouflage and deception items. Reconnaissance and counterreconnaissance cannot be completely separated. Each may provide information related to the other. Forces executing reconnaissance missions may be employed on counterreconnaissance at the same time. The order to the force must state which mission has priority. Counterreconnaissance becomes more difficult as dispersion of units increases.

6-17. Intelligence

Intelligence, mapping, geodetic, and terrain data are particularly important during an offensive operation, and result in an acceleration of associated intelligence and topographic activities. Often the advance will be into relatively unfamiliar territory, necessitating rapid updating of existing map; utilization of captured enemy maps; substitution of up-to-date aerial photomaps until topographic maps are available; rapid establishment or reestablishment of survey ground control; and production of terrain and weather studies. In meeting these intelligence needs, the battalion commander provides intelligence and information to three users: division; corps engineer; and the battalion and its subordinate and supporting units. The battalion intelligence officer (S2) assists the commander in these responsibilities.

a. Engineer Responsibility to Division. The division engineer furnishes timely information to the division commander and his staff on terrain; minefields and obstacles; effects of weather; effects of nuclear detonation on the terrain; enemy fortifications; enemy engineer troops, their capabilities, equipment, materiel, and techniques; routes of communication, and sources of usable engineer supplies and equipment. He works closely with the G2 in the preparation of the intelligence estimates and the intelligence annexes (FM 30-5). Spot reports on enemy engineer materiel should be disseminated through the G2 to the units of the division as quickly as possible. The division engineer assists the G3 in the preparation of the operation orders on matters pertaining to engineer intelligence, such as in the engineer and barrier annexes.

b. Engineer Responsibility to the Battalion. The division engineer as the battalion commander, assisted by the battalion S2, directs the intelligence activities of the battalion (FM 5-30). These activities are—receiving, evaluating, analyzing, and interpreting reconnaissance data; disseminating all intelligence information to subordinate and supporting units; preparing terrain analysis and studies for use of the battalion; and supervising engineer intelligence training.

6-18. Timing

Engineer intelligence must be placed in the hands of those agencies (troops commanders or staff sections) which need it, in time to permit them to make practical use of it in their planning and operations. Disseminating agencies must allow for both time of physical transmission and time to clear intermediate headquarters before the item of intelligence reaches the ultimate user. This is especially important in the case of dissemination downward; it is also important, in a fast-moving situation, with respect to dissemination in any direction. In urgent cases, partial or fragmentary reports may be sent; summaries may be sent by wire or radio, in advance of a complete report; or incompletely processed information may be disseminated, with a precau-

tionary note incorporated into the text of the report.

6-19. Sources of Engineer Information

a. The division engineer obtains engineer information in three ways—by the study of documents, to include the interpretation of photographs; from reconnaissance agencies; and by interrogation of individuals. More specifically, the sources are as listed below:

- (1) Aerial and ground reconnaissance.
- (2) Aerial and ground photographs.
- (3) Maps.
- (4) Prisoners of war.
- (5) Refugees.
- (6) Local civilians.
- (7) Captured enemy materiel.
- (8) Captured enemy installations.
- (9) Captured enemy documents.
- (10) Other documents, including texts, periodicals, and technical papers.
- (11) Intelligence publications (including terrain and weather studies).
- (12) Allied Forces.
- (13) Units in contact.
- (14) Higher headquarters.

b. These sources are available to, and used by, the engineers of commands at all levels, but in varying proportions. At divisional level, ground and short-range aerial reconnaissance and reports from other frontline troops are of vital importance. Such sources, supplemented by data from local intelligence sources such as prisoner-of-war statements, bring up to date the available intelligence on terrain and enemy installations. In a fastmoving situation, these may be the only sources of such intelligence.

6-20. Terrain and Weather Studies

a. The most effective employment of military forces requires consideration of weather and terrain from the start of a plan through its final execution. Accurate interpretation of the effects of weather and terrain not only increases the probability of success in operations, but also helps determine probable enemy courses of ac-

tion. The study of the area of operations aims to determine the effect of the terrain and weather upon the mission and upon the capabilities of the enemy. This determination is based on the key terrain features within the area and the best avenues of approach to them. The study frequently assists in eliminating those enemy capabilities not favored by the conditions of terrain and weather. For detailed information on terrain intelligence, see FM 30-10.

b. A terrain analysis is an evaluation of a piece of terrain in the light of the following five military aspects:

- (1) Key terrain features.
- (2) Observation and field of fire.
- (3) Cover and concealment.
- (4) Obstacles.
- (5) Avenues of approach.

c. The engineer, under the staff supervision of G2, is responsible for the production and maintenance of terrain studies based on technical analysis. These studies are either basic or interpretive. Basic studies emphasize the natural factors such as relief and drainage, vegetation, and soils. Analysis of these result in interpretative studies which indicate the terrain's suitability for military operations, such as its trafficability. Engineer terrain studies generally take the form of overprinted maps or overlays on which the various terrain characteristics are emphasized. This graphic description of terrain may, however, be supplemented by oral summary. Typical studies include—relief (plastic relief and layer tinting); cross-country movement; vegetation; routes of communication; drainage; surface materials; cover and fields of fire; and concealment and observation. Engineer teams are normally available at higher headquarters to assist the Division Engineer in fulfilling his terrain analysis responsibilities.

d. Weather forecasts originate with U.S. Air Force weather detachment combat support and combat service support units and are disseminated through intelligence channels. Weather forecasts covering periods ranging from less than 12 hours to more than 3 days can be obtained.

Section VII. SECURITY

6-21. Basic Considerations

The divisional engineer battalion commander is responsible for the security of his battalion and

all its units. However, in determining the security measures for the battalion, the commander takes into consideration the security measures of the division.

a. Definition. Security embraces all measures taken by a command to protect itself from espionage, observation, sabotage, annoyance, or surprise. It may be active or passive. Active security involves firepower and the use of troops. Passive security includes observation, cover, dispersion, camouflage, and the use of obstacles. The divisional engineer battalion commander employs a combination of the two.

b. Provision. Security detachments are required in all situations. Their mission is to protect the main force against surprise attack and observation by enemy ground and air forces and to maintain freedom of action for the commander by gaining the time required to make proper disposition of personnel and equipment. Since security forces lessen the strength of the companies, they are kept to the minimum strength necessary to accomplish their missions. They should be mobile; and they should have an efficient warning system, including observers and means of communication, to give prompt notice of any enemy threat from the ground or the air.

6-22. Security During Movement

a. General.

(1) Security must be provided for the movement of all engineer elements in the combat zone. The security techniques which the engineer commander employs during movement of his unit depend on the unit mission, security provided by others, terrain, visibility, and expected enemy actions. Tactical rather than administrative considerations govern the conduct of the march.

(2) An engineer unit moving on an independent mission provides its own security. However, it may frequently have combat forces attached or in support for security assistance. When security is provided by other units the engineer mission capability is increased. It requires security for the front (advance guards), for the rear (rear guards), for the flanks (flank patrols), during halts (march outposts), and against attacks from the air. The security detachments should be more mobile than the main body of the unit.

(3) When there is a probability of contact with the enemy, as in a fluid situation or when guerrillas are operating in the region, the commander provides for all-round security and develops plans to meet the attack. Individual weapons and ammunition are kept in the hands of troops. Machineguns are manned and dispersed throughout the column.

(4) The engineer battalion must be well trained in passive defense against air attack. Distance between vehicles is greater than in rear areas. Panel sets are kept in readiness for use to avoid attack by friendly aircraft.

(5) The importance of route reconnaissance and road guides and markers increases during a night march.

b. Frontal Security.

(1) Security in front is provided by an advance guard. For the battalion, its strength usually does not exceed a company; for a company, a platoon; and for a platoon, a motor patrol of one or two vehicles.

(2) The mission of the advance guard is to prevent unnecessary delay of the main body, to protect it from surprise, and to limit enemy observation from the front. An advance guard accomplishes its mission by searching the terrain to the front and on each side of the line of march and by overcoming hostile resistance that is contacted. When contact with the enemy is made, the advance guard will attack aggressively to overcome resistance within its capabilities. If the enemy force is too large for the advance guard to attack, the advance guard will cover the deployment of the main body by maintaining pressure against the enemy.

(3) A company acting as the advance guard for the battalion sends forward a squad as a point. The remainder of the company constitutes the advance guard minus.

(4) In smaller units, such as the company and platoon, the advance guard usually consists of a point and an advance party.

(a) The point is the leading element in the movement. It protects the column from enemy surprise. When the point encounters the enemy, it employs rapid fire and maneuver against the enemy force. It maintains contact with the enemy until the advance party has time to deploy.

(b) The advance party provides support for the point in the event that the point fails to eliminate the enemy. The advance party takes aggressive action against the enemy and tries to overcome the force so that movement of the main body is not delayed or halted. If the advance party fails to eliminate the enemy force, it maintains contact with it until the advance guard minus can be committed.

(c) The advance guard minus maintains contact with the advance party and should always be prepared to assist the advance party in

moving against the enemy force. If the advance guard minus is unable to reduce enemy resistance, it immobilizes the enemy by fire and maneuver until the arrival of the main body.

(5) Distances between the point and the advance party, between the advance party and advance guard minus and between the advance guard minus and the main body vary according to the speed of movement, terrain, visibility and enemy situation. Distances usually are decreased when enemy contact is imminent and during periods of reduced visibility. These distances are great enough to allow each succeeding element to deploy without serious interference from the enemy when contact is made. However, these distances are not so great as to prevent each element from rapidly assisting the element in front of it. At high speed, distances are increased; at low speed, they are decreased. Vehicles are spaced at distances of from 50 to 200 meters in order to provide protection against air attack and to maintain uniform speed.

c. Rear Security.

(1) Rear guards are used to protect the rear of a column advancing toward the enemy if an attack or harassing action from the rear is deemed within the enemy capabilities, or to protect the rear of a column marching away from the enemy.

(2) A company should adopt a formation similar to that of the advance guard in the reverse order of march. The distances between elements of the rear guard vary with the situation, the terrain, and the visibility. They correspond generally to the distance between elements of the advance guard. When the column halts, the rear guard dismounts and forms a march outpost.

(3) When an enemy pursuit is close, elements of the rear guard delay the enemy to permit the next preceding unit to make suitable dispositions. Fire is opened at long range. Usually, elements do not move toward the enemy to reinforce a lower element. The larger element occupies a delaying position to cover the withdrawal of the smaller element. The element in contact with the enemy then withdraws under the protective fires of the element occupying the delaying position. The rate of movement is coordinated with the main body.

(4) The rear point stops to fire only when enemy action threatens to interfere with the march. The rear point is not reinforced by other troops. When the rear point withdraws, it uses a route that does not mask the fire of the rear party.

d. Flank Security. In open terrain, flank security may be sufficiently assured by speed of movement and constant observation to the flanks. This usually will not suffice, however, in heavily wooded, rolling, or mountainous terrain, or where menace of guerrilla operations exists. Continuous flank patrolling is possible only where a parallel route exists (a condition not usually enjoyed by units of company size), but effective employment can be made of small flank patrols sent out to side roads, commanding ground, and points of observation. Flank security detachments usually are not strong enough to effectively delay the enemy. Their mission is to give early warning of enemy activity; hence; they must be equipped with adequate communication facilities. Security may be provided by helicopters overflying the convoy and maintains radio contact with the convoy commander.

e. Motorized Security Patrols. The motorized security patrol is used for reconnaissance and all types of security operations and particularly as the point of an advance or rear guard. Motorized patrols are limited in effectiveness by the fact that they are roadbound and easily ambushed and captured or destroyed. Therefore, at least two vehicles plus any other vehicles required for messengers are required. An engineer company moving alone has enough vehicles, weapons, and men to use more than one vehicle in either its advance or rear security patrol.

6-23. Security at Halt and in Assembly Area

Whenever an engineer unit is at a temporary halt during a march, or is in the assembly area, it provides its own security. It does this by establishing an outpost system to secure the main body against close observation and surprise by the enemy. The outpost system is so organized and disposed that it can deal with a minor enemy threat without disturbing the main body or forcing it to take action, and in case of a major threat, it can at least hold off the enemy until the main body can make preparation for action. The composition of the outpost varies for each situation. The outpost system consists of outposts, sentinels, and visiting patrols. Outposts should be positioned so they can achieve overlapping sectors of observation and mutual fire support. Sentinels may be required at night or during other periods of poor visibility to prevent surprise and for complete coverage of the area. Sentinels should be positioned forward of and be-

tween outposts within rifle-support distance of the outposts. When observation is limited or when outposts are widely separated, visiting patrols may be used to operate between outposts and sentinels. Communication is estimated between all elements of the outpost system and the main body. If the enemy penetrates any portion of the outpost system, the main body takes measures to protect itself. The measures provide for personnel who form a support or reserve force which counters the enemy penetration. All other personnel take action to secure the unit's immediate area. Interior guards, designated from elements of the main body, continue to carry out their duties within their assigned area. The engineer unit commander, if possible, halts in an area where there are few or no civilians. If this is impossible, all personnel are warned to keep civilians, including children, away from the area or not to allow them to enter until they are screened.

6-24. Convoy Security Detachments

Lone vehicles and convoys not capable of providing their own security are grouped and escorted through danger areas by armed security detachments. These detachments are specially organized and trained to protect convoys from hostile guerrilla actions and may contain elements of armor, infantry, and engineers. The size and composition of a detachment vary with the terrain, the capabilities of hostile guerrilla forces and the size and composition of the convoy. In high risk areas convoy elements should be small and well dispensed with ground and airborne control support. Traffic through known danger areas normally is controlled by traffic control points and patrols. The engineer element is placed well forward in the column to perform such engineer tasks as minor bridge and road repair, obstacle removal, and detection and removal of mines.

6-25. Unescorted Convoy Operations

When the divisional engineer battalion is not escorted through a danger area by a convoy security detachment, it organizes its own convoy security. Part of the available troops are placed well forward in the convoy and a strong detachment is placed in vehicles that follow the main body. Radio contact is established between the two groups if possible. Speed is essential. Sharp curves, steep grades, or other areas where low speed is necessary, must be reconnoitered by foot

troops. At the first indication of ambush, while the convoy is in motion, leading vehicles increase their speed if the road appears clear. In this effort to run through the ambush area, they go as fast as it is safe to drive. Drivers or assistant drivers of vehicles disabled by enemy fire or mines seek to direct their vehicles to the sides or off the roads so as not to block rear vehicles. Troops from vehicles stopped in the ambush dismount and return fire, using all weapons. Troops from vehicles breaking through the ambush dismount and attack back against a flank of the ambush position. The rear guard of the convoy, upon learning that the main body has been ambushed, dismounts and attacks forward against the other flank of the ambush position. If the enemy allows the main convoy to pass through and then ambushes the rear guard, troops from the main body return and relieve the rear guard by an attack against the flank of the ambush position. With the enemy firmly fixed artillery and air strikes should be employed to destroy him.

6-26. Security at Worksites

a. The amount of security forces provided to worksites is determined by the mission, guerrilla activity in the area, terrain, and the nearness of the enemy. The amount of engineer effort available at worksites is diminished when engineer troops must provide their own security forces. Whenever possible, supported units should be requested to provide security forces. The individual in charge of the worksite will remain responsible for the close-in security of engineer troops.

b. In forward areas of the combat zone, the principal types of enemy action against which the working parties take security measures are dismounted patrols, motor or mechanized raids, and air attacks. Near the rear of the zone, there is less danger of enemy ground action, except guerrilla attacks. Air, nuclear, biological, and chemical attacks may occur anywhere.

c. Enemy ground action usually can be guarded against by careful observation and by small security detachments covering probable avenues of approach. These may be supplemented by readily removable roadblocks, portable wire obstacles, and mines. The engineer in charge of the worksite withdraws as few men as possible from work to use for security. However, working parties are always prepared to defend against possible ground raids. They keep their weapons close at hand; and they are trained to react to their de-

ensive positions, with their weapons, when they receive the warning.

d. The engineer in charge of working parties prepares for security against air attack by training the parties in warning, concealment, dispersion, and fire. He trains the men to identify friendly and enemy aircraft (para 7-14 through 7-17 for employment of unit weapons against enemy aircraft). He posts guards at points of vantage; and he disperses and conceals equipment and vehicles which are not being used. He makes maximum use of the combat engineer vehicles and the personnel carriers, with their vehicular-mounted weapons. To provide security, when required, the individual in charge of the worksite has machineguns emplaced so that they can be used against low-flying aircraft. For protection against air attack on a major rear-area project, the responsible engineer officer requests air defense artillery through channels. He must, therefore, be completely familiar with local and general defensive artillery fire call procedures.

e. For security of ADM operation see FM 5-26.

6-27. Security Against Guerrilla Forces

Guerrilla bands usually employ offensive tactics characterized by surprise, mobility, deception, and decentralized operations (FM 31-16). The divisional engineer battalion commander insures that all engineer units are briefed on the fighting techniques of guerrilla forces. The precautions

and countermeasures which the engineer units use against guerrillas vary with the nature of the threat. At halts, and in assembly areas, guards are posted at all times including periods of rest and recreation. Groups of local inhabitants of any considerable size are not allowed near the assembly area. Local civilians are subjected to rigid security checks before they are allowed to work in engineer installations. Working parties observe security precautions while they are working, resting, and eating, and when they are going to and from the jobs. When a party leaves a task to return to camp, it takes with it all tools, transportation, and readily removable equipment. A party returning to an incompleted task is alert for ambushes, mines and boobytraps, and it gives special attention to the security of arms, ammunition, and other equipment of value to the guerrillas.

6-28. Security Against CBR and Nuclear Attacks

The engineer battalion commander is responsible for the security of the battalion and its components against chemical, biological, and radiological (CBR) and nuclear attacks. For information pertaining to unit protective and defense measures, see FM 21-40, FM 3-12, and FM 101-31-1. For information pertaining to individual protection see FM 21-41. Individual and unit training procedures are contained in FM 21-48.

Section VIII. STABILITY OPERATIONS

6-29. The Environment

In stability operations many factors contribute to making the environment different from that of limited or general war. Among these factors are—

a. The guerrilla attempts to select terrain which offers him an advantage by limiting the mobility of conventional forces.

b. Forces usually are dispersed over an extremely wide area, and operations are oriented toward control over the population of an area rather than establishment of a front.

c. The adversary generally is elusive, hard to identify, highly trained in the techniques of guerrilla warfare, and well motivated.

d. Gaining and maintaining the active support of the population is decisive in determining the

outcome of the conflict. The activities of military units are thus directed toward obtaining the organized support of the population, and each operation, whether tactical, logistical, or civil-military, must be evaluated for its probable impact on the population. Engineer units frequently devote significant effort to civic projects in addition to their normal combat support tasks.

6-30. Role of the Engineers

Divisional engineer battalions or elements thereof will support the division or divisional elements engaged in stability operations. Divisional engineers may also support the host country through independent operations. Engineer combat elements maintain their organizational integrity, but may be organized provisionally into task forces, depending upon the particular engineering skills and equipment required. For a general

discussion of the engineer units in stability operations, see FM 31-22, FM 31-23, and FM 5-1.

6-31. Engineer Capabilities

Engineer combat elements in a stability role may help in counterinsurgency operations by—

a. Providing traditional engineer assistance to indigenous military forces or to U.S. forces committed to stability operations.

b. Providing training assistance and advice to host country engineer forces.

c. Planning, organizing, and supervising construction projects to be carried out by indigenous personnel in accordance with U.S. or host country civilian or military programs.

d. Making engineer surveys to support engineer projects and to provide a basis for increased engineer assistance should the insurgency escalate.

e. Providing assistance in military civic action projects (digging wells, building schools, water irrigation systems, land clearing and reclamation) designed to improve the wellbeing of the people and to encourage their support of the host country forces. Land clearing operations in heavily forested or jungle areas will require support of the specialized engineer land clearing company. For operational details see chapter 5 of TM 5-330.

6-32. Special Considerations

When division engineer battalions are committed to stability operations, various problems and considerations not normally associated with conventional engineer operations will arise. Among these are the following:

a. Since units are usually dispersed over extremely wide areas, command supervision, to include training, maintenance, and other unit activities will be much more difficult.

b. Because of the nature of stability operations, the critical need for numerous construction projects, and the nationwide lack of engineering skills, there will be an especially heavy demand for engineer unit skills and knowledge.

c. With all engineer activities and projects generally susceptible to insurgent attack at any time, engineer unit commanders must insure that—

(1) Personnel are fully trained in the use

of all unit weapons and are continually alert to possible insurgent attack.

(2) Defense measures are taken around all engineer unit projects and activities.

d. Small unit commanders will be required frequently to make decisions based upon their own judgments, considering the situation at hand, rather than upon specific guidance and directions received from higher headquarters. The imagination and initiative of individual engineer commanders will especially contribute to the effectiveness of the engineer effort in stability operations.

e. Restrictions on tactical and logistical operations caused by political and psychological considerations may increase the time and resources needed to accomplish a specific task.

6-33. Civil-Military Operations Activities

Division engineer units will be required to undertake the following types of CMO activities in stability operations:

a. Community relations, including—

(1) Liaison with local authorities and civilian groups, participation in local civilian activities, and organization of activities with indigenous military units.

(2) Participation in programs to reduce friction and mitigate the effect of incidents arising from the presence of U.S. forces.

(3) Orientation of U.S. personnel as to local customs and insuring the proper conduct of troops toward the host country populace.

(4) Community relations projects designed to improve relationships between the U.S. military and local civilian groups, such projects are very short-term and involve quick reaction to requests and observed needs.

b. Civic action projects which improve the living conditions of the people and increase the loyalty of the people to the host country government. Civic action will normally be conducted by host country military units, with U.S. units providing advice, training, and support. Projects must be carefully designed and implemented to meet civilian needs and induce organized civilian support and participation. A PSYOP campaign should be conducted before, during, and after the completion of each engineer project. Requests for psychological operations and civil affairs assistance should be forwarded to higher headquarters. Areas of particular interest to the Division En-

gineer Battalion are construction of facilities and training of civilians in light construction, repair of facilities, and maintenance of equipment.

c. Military support of populace and resources control, with emphasis on preventing diversion of resources under battalion control.

6-34. Responsibilities for Civil-Military Operations

a. Civil-military operations, an essential part of stability operations, are the responsibility of commanders at each level of command. The battalion S3 supervises battalion participation in all Civil-Military Operations, whether directed by higher headquarters or initiated by the battalion to carry out the commander's politico-military responsibilities. The S3 coordinates thru channels

with civil affairs and psychological operations units to obtain information and operational support for activities beyond the capabilities of his unit.

b. Commanders and staff officers must be thoroughly familiar with applicable civil affairs agreements and the directives of higher headquarters. Commanders must insure that all personnel understand the provisions of appropriate directives and receive sufficient information on the customs of the local people. The conduct of personnel working directly with indigenous troops or the civil populace is particularly important.

c. Responsibilities for civil-military operations conducted in limited and general war are the same as for stability operations.



CHAPTER 7

DEFENSIVE OPERATIONS

STANAG 2123

Section 1. INTRODUCTION

7-1. Purpose and Forms of Defense

a. Purpose. Defensive operations are actions to prevent, resist, repulse, or destroy an enemy attack. The defense is undertaken to develop more favorable conditions for subsequent offensive operations, economize forces in one area in order to apply decisive force elsewhere, destroy or trap a hostile force, deny an enemy entrance to an area, or reduce enemy capability with minimum losses to friendly forces. The fundamental forms of defense are the mobile defense and the area defense. Generally, neither type is used in its pure form when conducting defensive operations. More often the most suitable form of defense for a given situation will be some variation of either the mobile or area defense, incorporating elements of each. The defense established is that which best meets the requirements of the particular situation.

b. Mobile Defense. The mobile defense is that form of defense in which minimum forces are deployed forward and priority is given to use of mobile combat elements and fires concentrated in the reserve. Primary reliance is placed on the use of offensive action by the reserve to destroy enemy forces. In the mobile defense, the defender plans to accept decisive engagement and to accomplish his mission primarily by executing offensive action against the attacking enemy forces. Control of the forward defense area and the retention of terrain are not primary objectives of the counterattack. The fixing forces, those minimum necessary forces committed initially in the forward defense area, conduct defensive, delaying, screening, or limited offensive operations in any combination required in order to make the attacker vulnerable to the counterattack. Mobility equal or superior to that of the enemy is essential for all elements of the defensive force. Figure 7-1 depicts a typical disposition of a divisional engineer battalion in a mobile defense.

tion of a divisional engineer battalion in a mobile defense.

c. Area Defense. The area defense is that form of defense in which emphasis is placed on retention of or control over specific terrain. Reliance is placed on the ability of fires and forces deployed on position in the forward defense area to stop and repulse the attacker. The forward defense area has a higher priority for combat power than does the reserve. In the area defense, the defender plans to accept decisive engagement and to accomplish his mission primarily by engaging the attacker along the forward edge of the battle area with a large volume and variety of fires. Counterattacks are conducted primarily to eject or destroy enemy forces that penetrate the position and to regain control of the forward defense area and terrain which the defense has been designated to retain. Figure 7-2 depicts a typical disposition of a divisional engineer battalion in an area defense.

7-2. Disposition of Engineer Support

Defensive areas include the security area, the forward defense area, and the reserve area.

a. Security Area. The division security area begins at the forward edge of the battle area (FEBA) and extends as far to the front and the flanks as security elements are employed. Forces in the security area furnish information on the enemy; delay, deceive, and disrupt him as much as possible; and provide a counter-reconnaissance screen. They also may have the mission of locating and developing nuclear targets. Forces operating in the security area may include elements from echelons higher than division, such as a corps covering force and units to provide aerial surveillance and flank security. Division forces in the security area will consist of the general outpost (GOP), combat outposts, flank

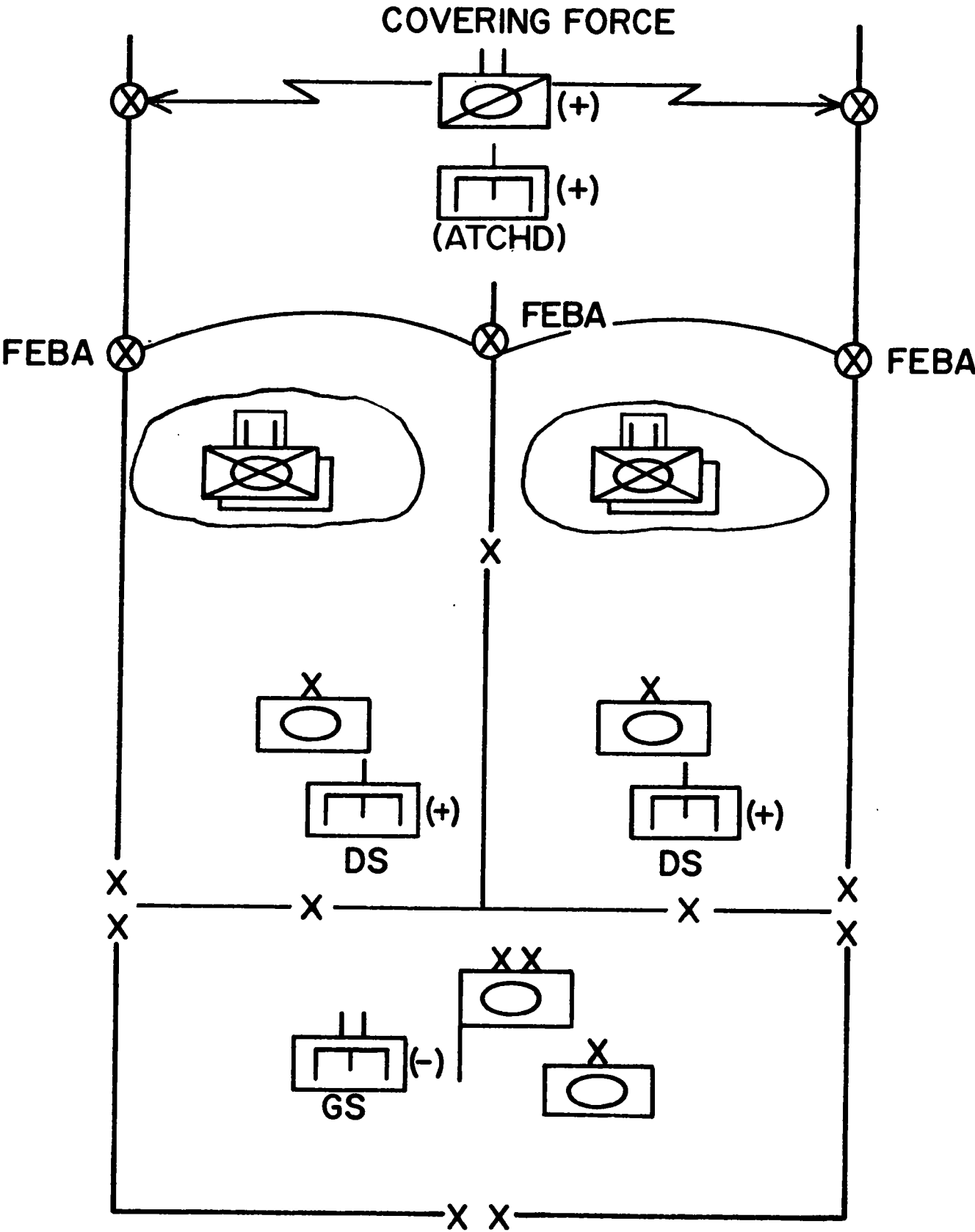


Figure 7-1. Typical disposition of a divisional engineer battalion in a mobile defense.

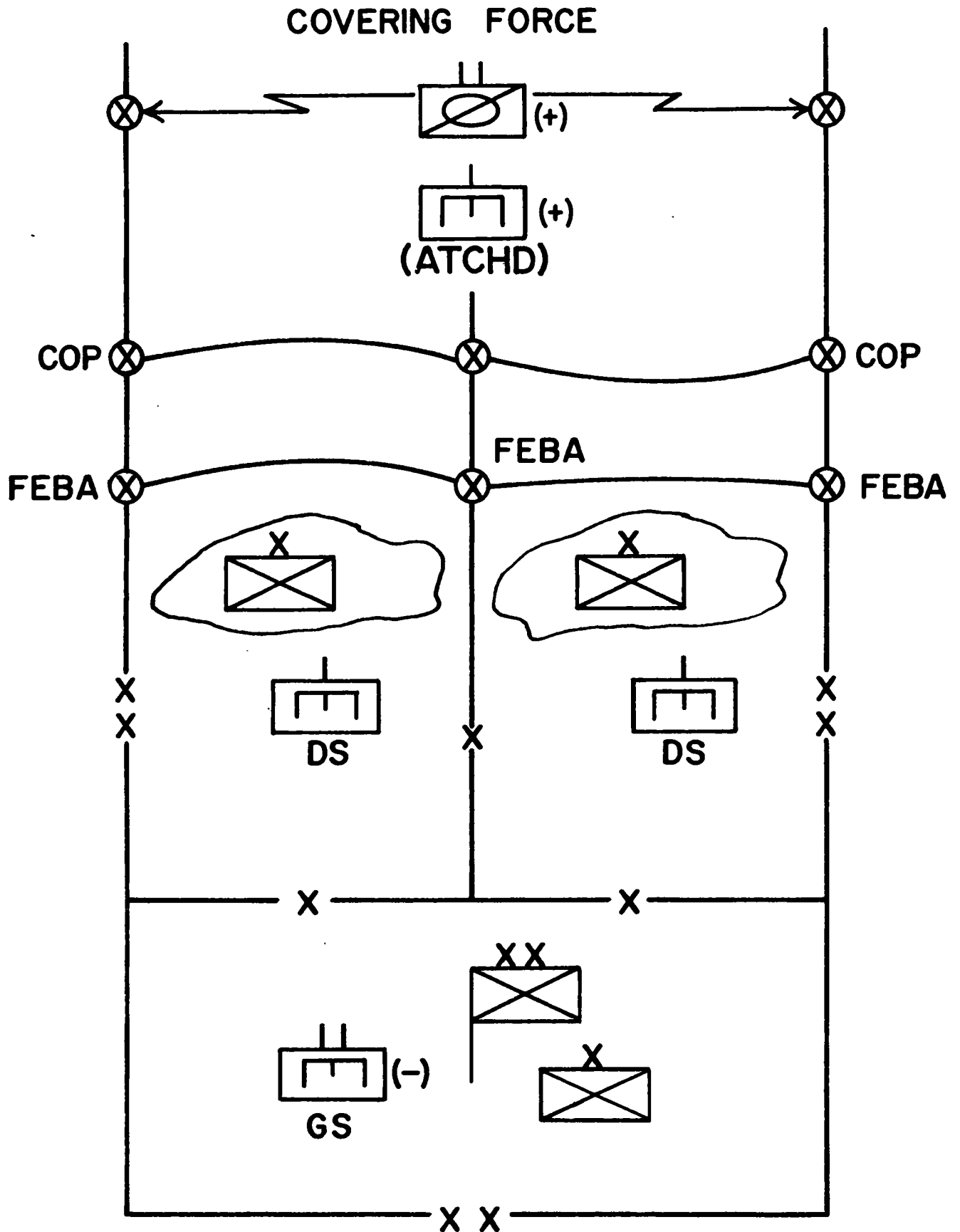


Figure 7-2. Typical disposition of a divisional engineer battalion in an area defense.

security forces, division aerial surveillance elements, and patrols. There is no prescribed organization for the general outpost or covering force. The GOP may be a brigade or elements thereof, a reinforced armored cavalry squadron, or a battalion task force as required. An engineer unit normally is attached to the GOP force. The engineer unit commander advises the general outpost or covering force commander on engineer work and assigns missions and areas of responsibility to his subordinate units. Each unit with an area assignment is responsible for keeping open the main withdrawal route within its area and preparing the obstacles along that route. Each unit is also responsible for preparation and execution of obstacles on the lateral roads within its respective area. On the combat outpost (COP), engineers have generally the same mission as in the GOP, though on a smaller scale. Engineer tasks would generally include preparation and execution of conventional demolitions and atomic demolition munitions; preparation of obstacles; and pioneer construction tasks.

b. Forward Defense Area. The forward defense area extends rearward from the FEBA to include that area organized by the forward committed units. The composition of forces in the forward area depends on the form of defense employed, but there is usually one engineer company in direct support of each committed brigade. The remaining engineer companies are in general support of the division and have a secondary mission of supporting other task forces on order. In the mobile defense, the fixing force commanders organize their areas by establishing defensive positions augmented by observation and listening posts and patrols. The positions are areas organized for all-round defense by elements varying in size from a company to a battalion task force. They are located to control terrain that dominates avenues of approach and to repel, delay, or canalize attacking forces. Alternate or successive positions are designated in depth. Because of the limited forces in the forward area, these positions cannot be initially occupied in depth. The forward defense force is allocated the minimum essential forces to carry out its mission. It normally is infantry heavy. In the area defense, the forward defense area is organized into defensive positions which provide good fields of fire, observation, and natural defensive strength. Positions are prepared to block avenues of approach at the FEBA and in depth to control the area. The natural defensive strength of the terrain is

increased as time permits by the use of artificial obstacles, fortifications, and barriers. For NATO forces non-nuclear demolition target folders should be prepared in accordance with STANAG 2123.

c. Reserve Area. The reserve area extends rearward from the forward defense area to the division rear boundary. The reserve echelon mans the reserve area, consists of those uncommitted forces held under division control, and is the principal means by which the commander influences the defensive battle and regains the initiative. The combat power of the reserve may consist of nuclear weapons, maneuver elements, or both. The reserve is organized to destroy or repulse the enemy by offensive action and must be prepared for timely commitment on division order. Should it be infeasible for the division to counterattack, the reserve may be employed in a blocking role to assist in containing the enemy penetration prior to the launching of the corps counterattack. One brigade headquarters normally is designated to control the reserve. However, in some situations, the reserve may be controlled by a provisional task force headquarters or placed under division control.

d. Primary Combat Support Missions in the Defense. Engineers may be attached to or placed in direct support of the brigades. Normal support is one engineer company for each brigade, although this is varied to meet specific requirements. Engineers with the security force normally are attached. The engineer battalion, less elements attached to major subordinate units, is kept under division control. The primary combat support missions of the division engineers in the defense are to increase the defensive capabilities of combat troops by assisting in the organization of the ground and in the preparation of defensive positions and to assist the movement of reserves in the counterattack. Engineers may prepare demolitions, lay minefields, and prepare and maintain routes. Obstacles are used extensively in the defense. Time permitting, the defensive capabilities of the ground are augmented by artificial obstacles and improvement of natural obstacles until a barrier system has been created through which the enemy cannot penetrate without a prohibitive expenditure of men and materials. The installation of obstacles is the responsibility of the area or sector commander; however, the commander may call upon engineers to supervise the construction and, if necessary, to perform the construction. For prescribed types of fortifica-

tions, see FM 5-15. The division engineer assists in the formulation of the overall barrier plan and its implementation. When authorized, atomic demolition munitions may be used to deny specific areas and strengthen the position. The decision to employ an ADM rests with the commander to whom the authority has been granted to expend. The engineer is responsible for designating the emplacing and firing unit and for coordinating the supply and movement of equipment, materials, and personnel to support the mission. The G3 coordinates tactical security and troop safety for ADM missions. The engineer battalion commander is responsible for the physical security of the munition, including the time during which the

ADM is in route from the special ammunition supply point (SASP). However, when the ADM team joins the tactical unit to which it is attached, responsibility for physical security of the ADM passes to the tactical unit commander. Command of an ADM operation normally is exercised by the tactical commander in whose area the emplacement is located. He is responsible for general area security, liaison, communications, and gives the order to detonate the munition. The ADM team chief directs all technical operations at the emplacement site, detonates the ADM on order from the tactical commander, and conducts the necessary operations in the event of a change of the ADM mission.

Section II. ENGINEER RESPONSIBILITIES IN THE DEFENSE

7-3. Security

The security measures taken in a defensive operation are essentially the application of the basic principles of maintaining security under any conditions (para 6-21 through 6-28).

7-4. Reconnaissance

a. As in the offense, engineer reconnaissance in the defense is continuous and detailed. Emphasis is placed on the preparation of routes for counterattack forces, obstacles, and demolition sites.

b. In an area defense the engineer battalion reconnaissance teams search the area in detail and report all items of engineer interest. These become the basis for barrier and obstacle plans; routes of supply, evacuation, and withdrawal, and denial operations plans.

c. A divisional defensive location is often on familiar terrain, and information on the area is available in corps or army. The division engineer is responsible for the collection and utilization of such available information.

7-5. Barriers and Obstacles

a. Barrier and obstacle planning is developed concurrently with other plans, and can be planned and executed by all echelons of commands. Extensive strategic or major tactical barrier systems, however, are directed by corps or higher. G3 has general staff responsibility for the tactical employment of barriers and obstacles, while the division engineer has the special staff responsibility for their planning. The division eng-

ineer prepares terrain and barrier studies for G2, and advises G3 as to ways of improving and extending natural obstacles. He plans and supervises the technical aspects of obstacle employment and prepares the barrier annex to the division operation plan or order, under the direction of G3. Division barrier and obstacle planning usually is supplemented by detailed planning of tactical obstacles at the brigade level.

b. The construction of obstacles for close defense is the responsibility of the unit commander involved, and may be integrated with a barrier plan of higher echelon. Normally, each combat unit is responsible for the construction of the obstacles or that part of a barrier system which lies within its area. These obstacles normally are defended by infantry or armored units.

c. Engineers furnish assistance to the combat units in the form of effort, advice, and technical supervision. They may be assigned the responsibility for the siting and construction of obstacles or blocking positions when one or more of the following conditions exist: special skills and equipment are required; flanks and rear are exposed; the command as a whole will benefit from the effort; the obstacles must be prepared before the arrival of the troops who will occupy the position; or the construction is beyond the capability of a particular defending unit.

d. In the defense, detailed coordination is necessary to assure that installation of obstacles and barriers will not interfere with the freedom of maneuver of defensive forces. Time permitting, the natural defensive characteristics of the terrain are improved and augmented by artificial

obstacles until a barrier zone has been developed which the enemy cannot penetrate without a costly loss. An effective method of erecting an obstacle in ordinary terrain is by demolition of bridges over unfordable streams. Bridges are prepared for demolition and destroyed, on order, to prevent them from falling into enemy hands. All "prepared" bridges must be adequately guarded to prevent enemy interference with the explosive. Craters or vertical obstacles on main road nets in locations difficult to bypass, such as heavy woods, steep sidehill slopes, or swamps, are also satisfactory obstacles.

e. In a mobile defense, obstacles and barriers are employed to delay or canalize the enemy. They must be carefully coordinated, however, because of the necessity for freedom of movement of the maneuvering forces in a counterattack. Gaps and lanes must be available for friendly armor and infantry to move forward or backward or to adjacent areas to occupy battle positions.

f. Mines are used as obstacles, or as supporting obstacles in a barrier system. The integration of chemical mines in the system produces contamination which makes breaching operations more difficult and time consuming. Extensive use of mines, however, poses a logistical burden.

7-6. Denial Operations

A denial operation is an operation designed to prevent or hinder enemy occupation of, or benefit from, areas or objects having a tactical or strategic value. Denial operations involve the removal, damage, or destruction of objects, or the denial of ground through the use of mines, flooding, or demolitions. Toxic chemicals and radiological contamination when authorized, may be used to restrict the use of an area through threat of casualties. A theater or theater army denial policy normally is the basis for detailed denial planning in the combat zone. It is a command responsibility, with authority usually delegated to subordinate commanders to effect denials as a normal activity within their areas, subject to the limitation and directive published by higher headquarters. The general and special staff responsibilities are the same for denial operations plans as for barrier plans. In the division, denial operations normally are incorporated in the barrier plans. The divisional engineer battalion is well suited and equipped to supervise and execute such denials. All troops, however, participate in certain aspects of denial operations, including the

destruction or organic equipment and supplies, procedures for which normally are included in the unit's SOP.

a. *Items Denied the Enemy.* Military supplies and equipment are evacuated to the extent possible. According to the Rules of Land Warfare of the Geneva Convention, medical supplies will not be destroyed intentionally but other supplies which cannot be evacuated are destroyed. The division and the engineer battalion are interested primarily in the denial of such items as military equipment and installations, military supplies, communication facilities (railroads and rolling stock, airstrips, bridges, highways, signal communication items), and public utilities (powerplants, reservoirs, and port facilities).

b. *Denial by Removal.* Evacuation of material is as much a part of denial operations as destruction. Evacuation must be started early and conducted in accordance with prepared priority lists. Every available means of transportation must be used to capacity, to save as much supplies and equipment as possible.

c. *Denial by Destruction.* All possible methods of destruction are used. The most common are fire, flooding or drenching, mechanical methods (such as breaking with a sledge hammer or cutting with an oxyacetylene torch), and explosives (FM 5-25), including ADM and thermite incendiary grenades. To assure destruction of material at the desired time, personnel to destroy each item are designated in advance; supplies necessary for the destruction are estimated and assembled at convenient locations; circumstances under which the destruction is to take place are prescribed; and, if orders for destruction are to be issued, the means for transmission of such orders are provided.

d. *Atomic Demolition Munitions.* Atomic demolition munitions may be used in denial operations. Normally, the officer responsible for the execution of an atomic demolition mission will be the demolition guard commander. However, the responsibility may fall to the commander of the ADM firing party (FM 5-26). The commander of the ADM firing party must be highly trained in all aspects of the ADM operations that are the responsibility of engineer personnel. He directs all operations at the emplacement site, takes emergency action in the event of a change of mission or misfire, and detonates the ADM on proper order. Engineer personnel prepare the emplacement site under the direction of the ADM firing

party commander. This preparation may include providing appropriate access roads, installing antitank and antipersonnel minefields or other obstacles when ordered, camouflaging the area to avoid disclosure of the operations, providing immediate security, and providing communication facilities. Engineer personnel install the ADM in the emplacement and complete all preparation of the munition and site. Detailed information on the employment of atomic demolition munitions is continued in FM 5-26.

7-7. Field Fortifications

a. The defense is built around a series of organized and occupied tactical positions which are selected for their natural defensive strength, their contribution to the mission, and the degree of observation they allow. These natural positions are strengthened by field fortifications, in consonance with the fire plan and the scheme of maneuver. Well planned and constructed fortifications should provide the desired degree of protection, and also bring the enemy under a maximum volume of effective fire as early as possible. Precautions are taken to conceal from the enemy the location of principal defensive elements. Concealment of real positions and the preparation of dummy and decoy positions normally proceed concurrently with other work. Plans normally provide for construction by phases, meaning that the protective construction proceeds from the minimum to the maximum practicable.

b. The siting and construction of field fortifications for the protection of troops are the responsibility of the individual unit commander involved. The staff engineer assists by preparing plans and orders and conducting technical inspection. Engineer responsibilities are primarily technical. The supervisory engineer personnel, however, are familiar with the tactical considerations affecting the organization of the ground. This allows them to give valuable technical assistance and advice. The engineer's primary responsibilities in the construction of field fortifications are to—

- (1) Furnish technical advice and assistance.
- (2) Accomplish large-scale excavation and backfilling.
- (3) Increase the effectiveness of extensive emplacements through the creation of protective obstacles.

c. Construction priority of weapons emplacements, command posts, and other shelters pro-

vides for efficient use of available time, personnel, tools, and materials. It insures the maximum value is derived from the time and labor already expended, if the area is attacked before construction is completed. Local materials and expedient construction are used to reduce logistical requirements. Construction work to strengthen the position is continued during the entire period of occupancy. For types of fortifications, see FM 5-15.

7-8. Camouflage

The basic principles of camouflage in an offensive operation are followed in a static or defensive situation (FM 5-20). The responsibility for camouflage rests with the commander. However, all troops must be trained in and continuously apply basic camouflage principles, particularly in the concealment of themselves, their materiel, and their positions. Technical advice and assistance are responsibilities of the engineers. The division engineer under the general staff supervision of the division G2, normally is responsible for camouflage planning, in coordination with the operations and supply sections. In a fast moving situation, time may not permit the extensive use of artificial concealment materials, and troops must then use the terrain to maximum advantage for concealment. Engineers can advise and assist in this function.

7-9. Engineer Work in the Division Rear Area

Priority for engineer effort in the division rear area is in support of the reserve. Blocking positions in the rear of the forward defense area are planned by the division and are prepared by maneuver battalions of the reserve, assisted by engineers, or they may be prepared by engineers under guidance of the commander of the unit which will occupy the position. Positions are selected and organized to prevent major penetrations from securing lightly held or exposed flanks. The positions may be occupied by elements of the division reserve. Full advantage is taken of natural terrain features. Positions are prepared for all around defense. Emphasis is placed on defense against armored attack and possible nuclear strikes. Engineers play an important role in the preparation of rear defense and in the construction of alternate positions. Engineers in the rear area normally are in the general support and perform all types of engineer work. Typical assignments for engineer troops located in the rear area include—

a. *Road and Bridge Maintenance (Construction and Repair)*. In the division rear area, there will be a continual buildup and replenishment of supplies and equipment. This results in an added amount of traffic on the road network. Since all defensive operations are dependent upon the mobility of units and supplies, it is of great importance that the roads and bridges be kept open at all times.

b. *Command Posts* Division and brigade command posts must attempt to avoid presenting profitable targets for enemy nuclear weapons. Such command posts must be dispersed, concealed and sufficiently dug in to prevent excessive damage from nuclear attack. The necessity for alternate command posts for division as well as brigade headquarters will increase appreciably the workload of the engineers. The preparation of positions and obstacles to provide a base of security for the division command post should be coordinated with the division provost marshal and the military police security platoon leader.

c. *Division Artillery Positions*. Engineer effort may be required to assist in preparation of artillery positions for rapid displacement of artillery units.

d. *Water and Water Points*. The operation of water points is the responsibility of the engineer battalion S4, but the engineer companies assist in site preparation. This assistance includes clearing, construction of access roads, and necessary leveling and excavation to make the sites suitable.

e. *Mine Removal*. If the defense is to be undertaken in an area previously occupied by the enemy, minefields may have been breached. As the buildup of the area increases, it may be necessary for engineer units to enter these mined areas and remove or destroy the mines still in place.

f. *Prisoner of War Collecting Points*. Although military police are responsible for controlling prisoners of war, engineers may be required to construct prisoner of war facilities.

✓ g. *Air Landing Facilities*. It will be necessary to prepare landing facilities for aircraft (TM 5-330). This generally will consist of clearing and area large enough to receive the aircraft, and limited leveling and excavation to make the ground trafficable for the aircraft. Examples of this type of work include clearing of brush, trees, or telephone lines from the sides of a road so that the road can be used as a landing strip, and filling craters or removing vegetation from an area of sufficient size to allow helicopter landings.

h. *Preparation and Maintenance of Installations*. Preparation and maintenance of support command installations in the division rear area will require engineer effort. The Division Engineer Battalion may be forced to seek nondivisional engineer assistance to properly support this mission. This work will include emplacements for signal communications equipment, supplies, and preparation of areas for the medical battalion to receive mass casualties. The supply and transportation and maintenance battalions may also require assistance in preparing their areas.

Section III. DEFENSE AGAINST NUCLEAR ATTACK

7-10. Application

Although this section is in the chapter on defensive operations it is applicable generally to all forms of tactical operations, not only defensive.

7-11. Engineer Effort

Division headquarters will control the engineer effort in defense against nuclear attacks. Such engineer effort includes measures taken to reduce the vulnerability of friendly forces to nuclear attack and to facilitate their recovery after the attack. These measures include duplication, dispersion, deception, camouflage, and construction of major divisional shelters before a nuclear at-

tack. They include reconstruction and assistance in decontamination and area damage control measures after the attack. The engineer effort expended on each task will be determined by the situation and the importance of the installation or facility to the division mission. The commander should weigh these measures in deciding on the employment of the engineer units in a damage control role. Nuclear defense is defined as the methods, plans, and procedures involved in establishing and exercising defensive measures against the effects of an attack by nuclear weapons or radiological warfare agents. It encompasses both training for, and implementation of, these methods, plans, and procedures. It is interpreted to include measures such as—

a. Training and distribution of personnel with special reference to radiological specialists.

b. Preparation and maintenance of fixed and portable structures and equipment.

c. Teaching defense techniques and procedures, including use of detection equipment; protection or removal of exposed personnel; and decontamination of personnel, equipment, structures, or terrain.

7-12. Prestrike Operations

Each commander is responsible for construction of installations required for radiological defense. He considers the protection to be gained through special types of construction, the location of new shelters, and special command posts. Additional prestrike tasks include the following, as time permits:

a. Survey of area for suitable shelter locations.

b. Disperse unit personnel, equipment, and supplies consistent with operational practicability.

c. Cover essential equipment and supplies with canvas or other material for protection against contamination.

d. Organize unit medical, rescue, and evacuation teams.

e. Organize a radiological defense warning system.

f. Prepare a radiological defense SOP based upon that of the next higher headquarters.

g. The division engineer is responsible for—

(1) Selection of alternate sites for water points.

(2) Selection and preparation of alternate bridge crossing operations.

7-13. Poststrike Operations

The engineer mission in case of a nuclear attack is expected to be essentially the same as for other types of attack, but to be complicated in practice by the destruction effects of nuclear weapons and the additional hazards of residual radiation. Rescue squads will be organized and equipped to remove casualties and to render first aid. Labor and equipment squads will be organized and equipped to clear debris, search for casualties, assist in decontamination and evacuate materials. The removal of victims from the wreckage of collapsed buildings will often be a task requiring structural knowledge and engineering judgment. After the burst, engineers may be required to—

a. Perform first aid, rescue, and evacuation tasks.

b. Prepare personnel and equipment decontamination stations.

c. Make and post radiological contamination markers for contaminated areas.

d. Decontaminate vital areas or evacuate supplies to safe areas.

e. Fight fires.

f. Clear debris and trees from essential routes to facilitate relief, supply, and evacuation.

g. Remove or cover radioactive materials in contaminated areas.

h. Assist in the extrication of units or elements trapped by blowdown, rubble, and fire.

i. Produce potable water.

j. Provide information to division traffic headquarters on the status of routes to include estimates of times required to reopen closed routes.

k. Perform other special and general engineer tasks as required.

Section IV. EMPLOYMENT OF UNIT WEAPONS AGAINST AIRCRAFT

7-14. General

The low altitude air threat which faces divisional engineer combat units may be partially countered by aggressive use of the large volume of fire which unit organic weapons (rifles and machine-guns) can place against this threat. Large volumes of fire from nonair defense weapons have proven capable of destroying both high and low speed aircraft or disrupting their attack. Use of unit weapons in this role must be balanced

against the requirement to prevent disclosure of positions. Air defense weapons such as Redeye and Chaparral/Vulcan will enhance the capability of countering the low altitude air threat.

7-15. Rules of Engagement

In the absence of orders to the contrary, personnel will use organic weapons to engage attacking aircraft; engagement of all other hostile aircraft will be on orders issued through the unit chain

of command and will be supervised by unit leaders. Nothing in this rule is to be taken as requiring actions prejudicial to accomplishment of the primary mission of the unit.

7-16. Techniques

The following techniques should maximize the destructive and/or deterrent effect against aircraft. Aircraft may be divided into two categories—low speed and high speed. Low speed aircraft include helicopters and liaison, reconnaissance, and observation fixed wing propeller aircraft. High speed aircraft include all jet fixed wing aircraft. This distinction will result in simplified engagement procedures.

a. Engagement of Low Speed Aircraft. In accordance with the rules of engagement, engage low speed enemy aircraft with aimed fire, employing the maximum weapon rate of fire. Aerial gunnery techniques generally applicable to all small arms and automatic weapons are presented in FM 23-65.

b. Engagement of High Speed Aircraft. In accordance with the rules of engagement, engage high speed enemy aircraft with maximum fire aimed to intercept the aircraft flightpath to force it to fly through a pattern of fire. This technique is not unaimed "barrage" fire, but requires a degree of armed fire. It does not, however, call for careful estimation of aircraft speed and required lead.

c. Use of Tracer Ammunition. This type of cartridge is intended for use with other types to show the gunner, by its trace, the path of the bullets, thus assisting in correcting aim. The highest practical proportion of tracer ammunition should be used to enhance the deterrent or disruptive effect. Tracer ammunition will also reveal friendly positions to the enemy. Limited use of tracer am-

munition should be considered if engagement is desired without totally fixing friendly positions.

d. Massed Fire. Units should employ a massed fire technique when using small arms and automatic weapons in an air defense role.

7-17. Standing Operating Procedure

Battalion and company SOP should cover, but not be limited to, the following items relevant to engagement of aircraft with nonair defense weapons:

a. Applicability. Operators of designated weapons.

b. Relation to Primary Mission. Primary mission is never prejudiced.

c. Relation to Passive Air Defense. The necessity for aggressively engaging hostile aircraft is balanced with the requirement to place in proper perspective the tactic of withholding fire to preclude disclosure of position.

d. Authority to Engage. Authority to engage attacking aircraft is delegated to personnel armed with individual weapons and to engage all other hostile aircraft on order through unit chain of command, subject to the rules of engagement.

e. Rules of Engagement. Normally self-defense only against all attacking aircraft and those positively identified enemy aircraft which pose a threat to the unit.

f. Rules for Withholding Fire. When ordered. When not positive that aircraft are actually enemy. When friendly aircraft or troops are endangered.

g. Firing Techniques. Lead and superelevation. Massed fire. Maximum rate of fire. Maximum use of tracer ammunition.

h. Unit Training Requirement. Motivation and discipline. Gunnery. Aircraft recognition.

Section V. ENGINEER RESPONSIBILITIES IN RETROGRADE MOVEMENTS

7-18. Retrograde Movements

a. Introduction. Retrograde movements are movements to the rear or away from the enemy, and are classified as withdrawals, delaying actions, and retirements (FM 61-100).

b. Conduct. Within a division in contact with the enemy a combination of these retrograde op-

erations may be conducted simultaneously or in sequence as one operation develops into another. Such operations may be forced by enemy action or may be executed voluntarily. In either event, the operation must be approved by the higher commander. A well planned, well organized, and aggressively executed retrograde operation provides opportunities for inflicting heavy damage

to enemy troops and material. In the conduct of a retrograde operation, the division will employ a combination of offensive, defensive, and delaying tactics. Because of their inherent characteristics of tactical mobility and extensive communications, the armored and mechanized divisions can cover a wider front in retrograde operations than the infantry division.

7-19. Purpose

Retrograde movements are conducted to accomplish one or more of the following:

- a. To harass, exhaust, inflict punishment upon, resist, and delay the enemy.
- b. To draw the enemy into an unfavorable situation.
- c. To permit the employment of all or a portion of the command elsewhere.
- d. To avoid combat under undesirable conditions.
- e. To gain time and avoid fighting a decisive engagement.
- f. To disengage from battle.
- g. To conform to movement of other friendly troops.
- h. To shorten lines of communication.

7-20. Withdrawals

Withdrawals may be executed either during daylight or at night and may be conducted under enemy pressure or not under enemy pressure. Voluntary withdrawals are favored over involuntary withdrawals since the former are conducted without direct enemy pressure. Voluntary withdrawals provide freedom of action, facilitate deception, and reduce the effectiveness of observed enemy fires. A withdrawal under enemy pressure is avoided, if possible, because observed enemy fires may result in heavy casualties and loss of freedom of action. Regardless of the type withdrawal being conducted, contact is maintained with the enemy forces.

7-21. Delaying Action

The division accomplishes a delaying mission by delay on successive positions, delay on alternate positions, or by a combination of the two techniques. Continuous delay is inherent in each of the techniques and requires constant contact with

the enemy by some portion of the delaying force, including the use of long range firepower and maneuver, to cause him to deploy, reconnoiter, maneuver, and take other time-consuming measures. Delay on alternate positions can only be used when the division can accomplish its mission and occupy two positions simultaneously. This normally will occur when the frontage assigned the division is relatively narrow. Delay on successive positions may be used when a relatively wide front is assigned to the division. In either technique, continuous delay is sought on and between positions. Delaying positions should be far enough apart to cause the enemy to regroup prior to continuing the attack from one position to the next. Delaying positions are sought which incorporate the following:

- a. A series of parallel ridges across the lines of hostile advance.
- b. Unfordable streams, swamps, lakes, and other obstacles on the front and flanks.
- c. High ground with good observation and long-range fields of fire.
- d. Concealed routes of withdrawal.
- e. A road net and/or areas providing good cross-country trafficability.

7-22. Retirement

A retirement may be made following a withdrawal or when there is no actual contact with the enemy. When a withdrawal precedes a retirement, the retirement begins after the main forces have broken contact with the enemy and march columns have been formed. Security for the main body is provided by advance, flank, and rear guards. When the retirement is preceded by a withdrawal, a strong rear guard will be required to employ delaying tactics if it is taken under fire, to delay the advancing enemy and to prevent interference with the movement of the main body.

7-23. Engineers in Retrograde Operations

a. Engineers may be placed in direct support, general support, or attached to, combat maneuver units as the situation demands. Execution of the division barrier plan, construction of obstacles and rearward positions, and road maintenance may dictate a centralized engineer effort. The requirements for engineers by units in contact with the enemy may dictate attachment of engineers. Brigades may further place engineers in direct

support of battalion task forces. Unless additional engineers support is furnished from outside the division, attachment of engineers to combat units may decrease the effectiveness of the engineer effort.

b. One of the most important functions of the engineers will be to provide advice and assistance in the overall formulation and implementation of the barrier plan. Barriers (obstacles) are used by the retrograde commander to delay the enemy or canalize him into areas where he can be destroyed with nuclear or nonnuclear fires. Well-planned and widespread use of barriers, to include chemical contaminated barriers, assists in gaining time and in avoiding close pursuit. Sub-surface or surface nuclear demolitions may be employed to create craters and contaminated areas, and to slow or impede the enemy's advance (FM 5-26). Barrier plans are coordinated with higher headquarters to prevent interference with future operations. The barrier plan is developed and prepared as an annex to the operations order (plan) by the division engineer in coordination with the G3 (responsible staff officer).

c. Detailed plans are prepared for demolitions along enemy avenues of approach and those routes which lead into the division sector. Particular attention is given to the destruction of bridges and tunnels. Demolitions are placed in defiles and on routes traversing natural and artificial obstacles as well as lateral routes through the division sector. Demolition plans include—

(1) Provisions for placing and firing the necessary demolitions.

(2) Adequate guards to prevent premature firing of charges or seizure by enemy infiltrators.

(3) Fixed responsibility for the destruction of bridges.

(4) Schedule for destroying bridges no longer needed by friendly forces.

(5) Covering by fire, including chemical or nuclear fires, those obstacles created by demolitions or other means.

d. The destruction of bridges is of major importance to the retrograde force commander. Care is exercised to insure that bridges are not destroyed prematurely or that they are not seized intact by the enemy. To accomplish this, responsibility for destroying bridges within his sector is delegated to the tactical commander. This delegation of responsibility is often subject to specific restrictions imposed by the higher commander. A demolition firing party and a demolition guard are designated for each bridge to be destroyed. The guard commander has the authority to destroy the bridge, subject to conditions established by the higher commander. A list of all units that are to use the bridge is furnished the guard commander. Each unit commander notifies the guard commander when his unit has cleared. After the main body has crossed, the majority of the bridges in the sector are destroyed. Certain predesignated bridges are left for use by security elements. The demolition guard commander is responsible for destroying the bridge to prevent its capture by the enemy, but will do so only in accordance with the provisions of the demolition plan (app D).

CHAPTER 8

ENGINEER REORGANIZATION FOR COMBAT

8-1. Introduction

The divisional engineer battalion, or any element thereof, engages in combat when—

- a. The enemy prevents access to the unit's job site.
- b. The enemy attempts to drive the engineer unit from a job site.
- c. The enemy prevents delivery of supplies.
- d. Enemy action forces a combat role. This may develop in several ways—
 - (1) The unit commander is forced into a combat role in order to save the unit.
 - (2) Enemy action forces the unit to fight so the higher command can accomplish its mission.
 - (3) Because of the situation, the division commander decides to commit the engineer unit.

8-2. Contingency Planning

An engineer battalion usually has its combat engineer companies in support of each committed brigade with elements of the bridge company and the headquarters company's equipment platoon supporting these companies. The remaining "operational" elements of the battalion are committed throughout the division area in general support of the division. Consequently, it is difficult to reorganize the battalion as a unit for combat. However, the battalion and each combat engineer company must plan for such a contingency and for commitment in combat as separate elements with the supported forces. These contingency plans are established in the battalion and company standing operating procedures (SOP) and are kept current based on the unit's current and anticipated missions and actual status. In the development of these plans, the battalion and each company coordinate with the next higher headquarters and the supported force.

8-3. Employment

If it becomes necessary to employ the engineer battalion or its elements in a combat role, the unit

must be prepared to execute this mission with the minimum amount of delay. Engineer elements should be committed as a unit to preserve unit integrity. The major force commander makes the decision to commit engineer units to a combat role. Some situations where an engineer unit may be committed to a combat role are an over-extended defensive area; a sudden enemy penetration or envelopment; an enemy airdrop or guerrilla activity in a rear area; or a need to relieve a combat force that must be committed to a more decisive combat role elsewhere. The major force commander will commit the engineer unit only after careful consideration of the following factors:

- a. The seriousness of the situation—will the enemy force be able to affect the command seriously if the engineer unit is not committed?
- b. The loss of engineer support—can the command afford the temporary loss of engineer support?
- c. Strength of the engineer unit—does the engineer unit have enough personnel to be effectively employed?
- d. Support to the engineer unit—will the mission be of an offensive or defensive nature, and what fire and logistical support can the engineer unit expect to receive from adjacent and higher units in carrying out its mission?

8-4. Types of Missions

An engineer unit may receive an offensive or defensive mission. However, it has less combat effectiveness than an infantry unit of similar size because it has less equipment and fewer supporting weapons. Also an engineer unit undergoes less extensive infantry combat training. In the defense, to compensate in part for these disadvantages, an engineer unit is assigned a smaller frontage than an infantry unit of corresponding size. Additional firepower and fire support must be furnished by the force commander.

a. Offensive. The divisional engineer battalion might receive a mission to assist other combat forces in securing an objective of critical importance to the overall operation, or to destroy an enemy stronghold in the division zone, such as a small bypassed enemy unit—but this type of commitment is rare.

b. Defensive. The defensive type mission is the one most commonly assigned to division engineer units. The major force commander should allow time for the engineer unit to prepare for this mission. Time is needed to coordinate the proper type of support and to move nonessential personnel and equipment to a rear area where they will not be captured or destroyed by the enemy force. When ample warning time is available to the engineer commander, he prepares his unit for battle in the same way as any other combat force commander.

8-5. Preparation for Combat

Commitment of the engineer battalion in a combat role normally is limited to headquarters company and the combat engineer companies. The bridge company usually remains intact, subject to call by the division engineer missions. When modified for combat, the engineer company is capable of furnishing command and combat elements. Normal organization is changed to provide effective use and control of crew-served weapons, for security of equipment not needed for combat, and for the requirements of command, communi-

cation, and supply in combat. The extent of modification for combat varies with the size of the unit, the time available, and the mission. When engineers are committed to a combat role, there usually is time to make the necessary initial changes before meeting the enemy. The battalion, battalion headquarters, headquarters company, and the engineer companies are each organized into forward and rear echelons. The forward echelon consists of sections and units to accomplish the combat mission. The rear echelon includes all of the equipment and personnel not essential to the mission. The number of personnel assigned to the rear echelon is the minimum necessary to maintain the mobility of the rear echelon, provide for its local security, and perform essential support functions. The rear echelon moves to a rear area designated by the commander.

8-6. Fire Support and Communications

Engineer units normally require additional fire support when committed in a combat role. Fire support is best provided when the engineer battalion is attached to the supported force and is employed as a part of it. The force commander then is responsible for furnishing supporting fire. Forward observers and liaison personnel from field artillery units and forward observers from mortar units join the engineer units as they would an infantry unit. If the battalion is committed as a unit, the combat engineer vehicles from the companies can be grouped to be employed as di-

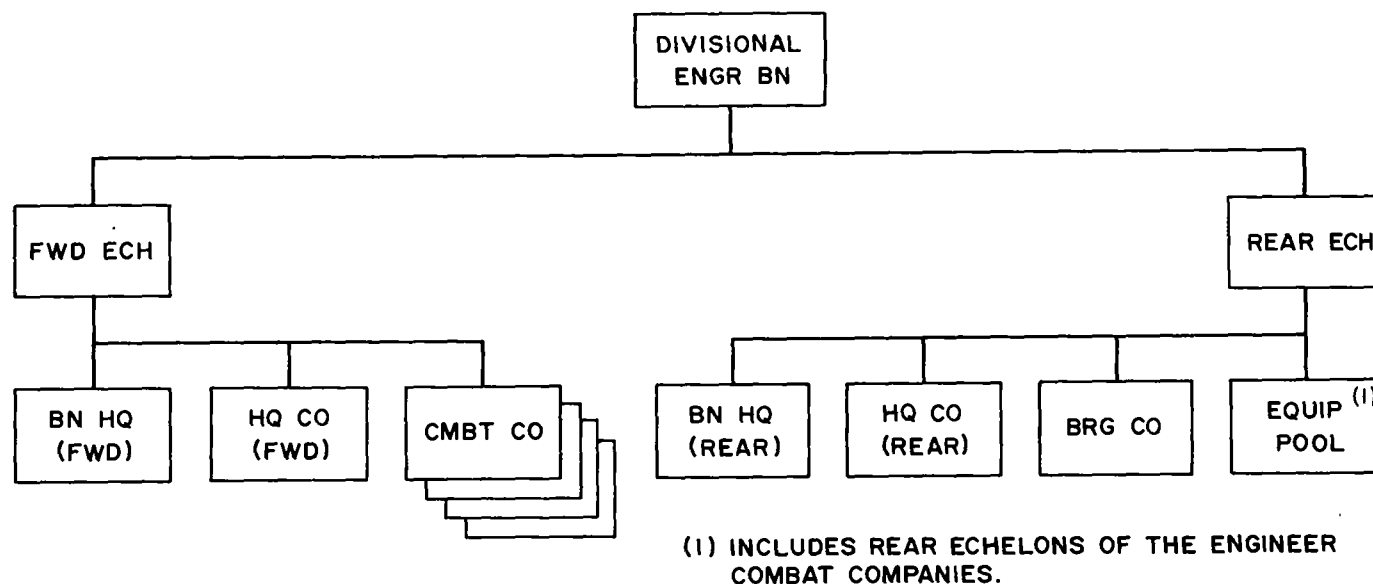


Figure 8-1. Divisional engineer battalion reorganize for combat.

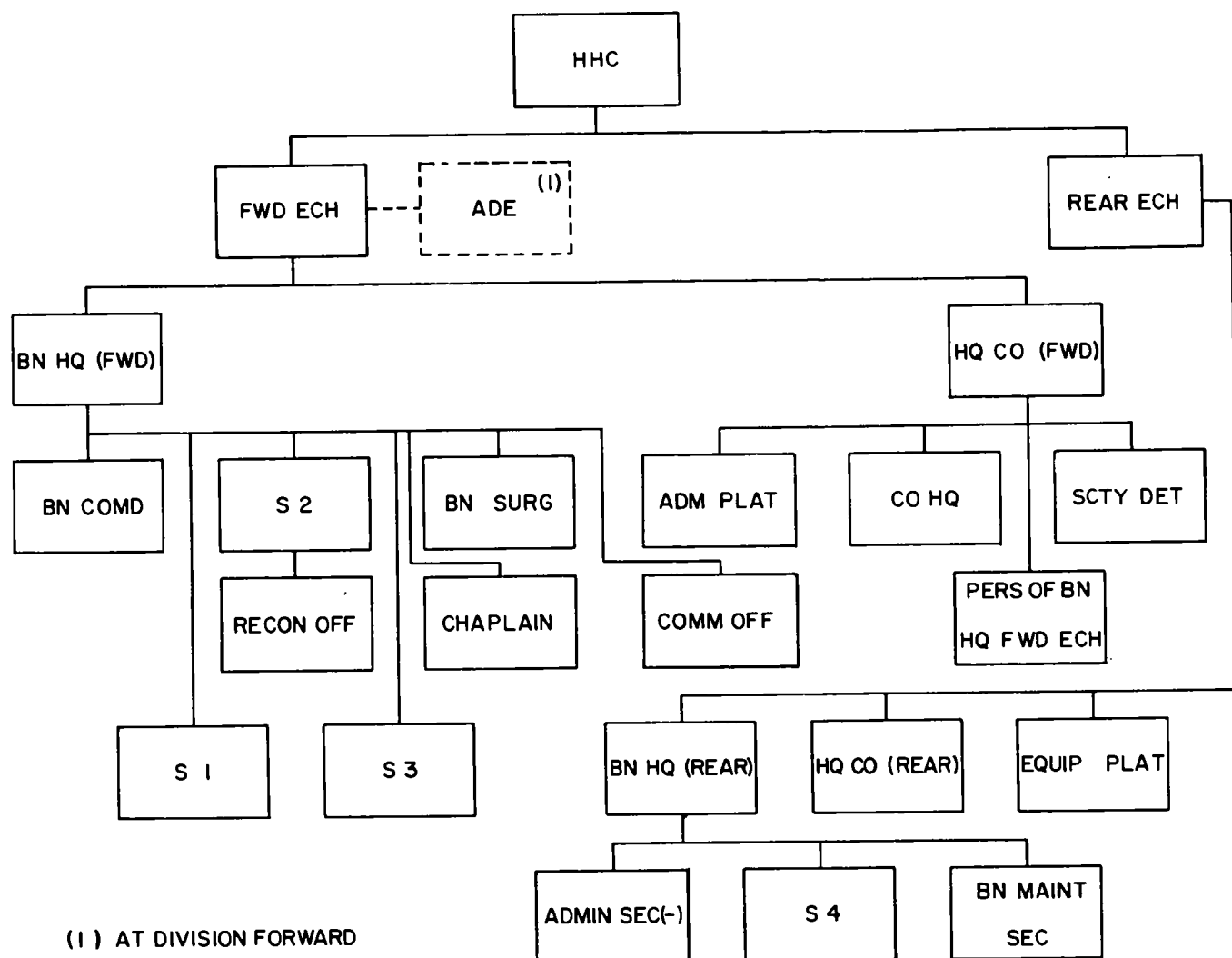


Figure 8-2. Headquarters and headquarters company reorganized for combat.

rected by the battalion commander. The engineer unit enters the radio net of the organization to which it is attached. The use of prearranged signals is coordinated. In static situations, wire communication may be established. In addition, messengers and sound and visual signals may be used. Whenever possible, supporting field artillery units should provide normal field artillery wire nets to supported engineer units.

8-7. Suggested Guide for Reorganization for Combat

A definite plan, a part of the unit's SOP, must be established which will enable the unit to reorganize efficiently for combat. It is not desirable to establish a standard plan for all engineer units. Each unit has individual operating characteris-

tics which must be considered in any plan for reorganization. Following is a suggested guide for reorganizing for combat.

a. Divisional Engineer Battalion (fig 8-1).

(1) *Forward echelon.* The forward echelon of battalion headquarters is under the immediate control of the battalion commander. It operates the battalion command post and provides the staff agencies necessary for the conduct of tactical operations.

(2) *Rear echelon.* Members and equipment of the battalion staff sections which are not required for the combat mission become part of the rear echelon. The battalion rear echelon is commanded by the senior officer present, usually the S4.

b. Headquarters and Headquarters Company (fig 8-2).

(1) *Forward echelon.* The forward echelon of headquarters company consists of the personnel and equipment of battalion headquarters necessary to establish, operate, and defend the battalion command post. It is commanded by the company commander.

(2) *Rear Echelon.* The rear echelon is composed of personnel and equipment not required in the forward echelon. Available personnel and equipment of the company may be detached and used by the division engineer on engineer tasks elsewhere.

c. Combat Engineer (fig 8-3.)

(1) *Forward echelon.* Personnel and equipment to accomplish the combat mission are form-

ed into a forward echelon. Companies are modified so that each will have a headquarters and three combat platoons and, if desired, a separate combat engineer vehicle section.

(2) *Rear echelon.* The rear echelon moves to a rear area designated by the commander, normally with the remainder of the battalion rear. The mission of the rear echelon is to support the company's operation and to provide its own security.

d. Bridge Company. The bridge company normally is not committed in a combat role. When the battalion is committed the bridge company normally moves to the rear and becomes a part of the battalion rear echelon. It assists in providing part of the security element for that area. The division engineer may assign some essential engineer tasks to the bridge company.

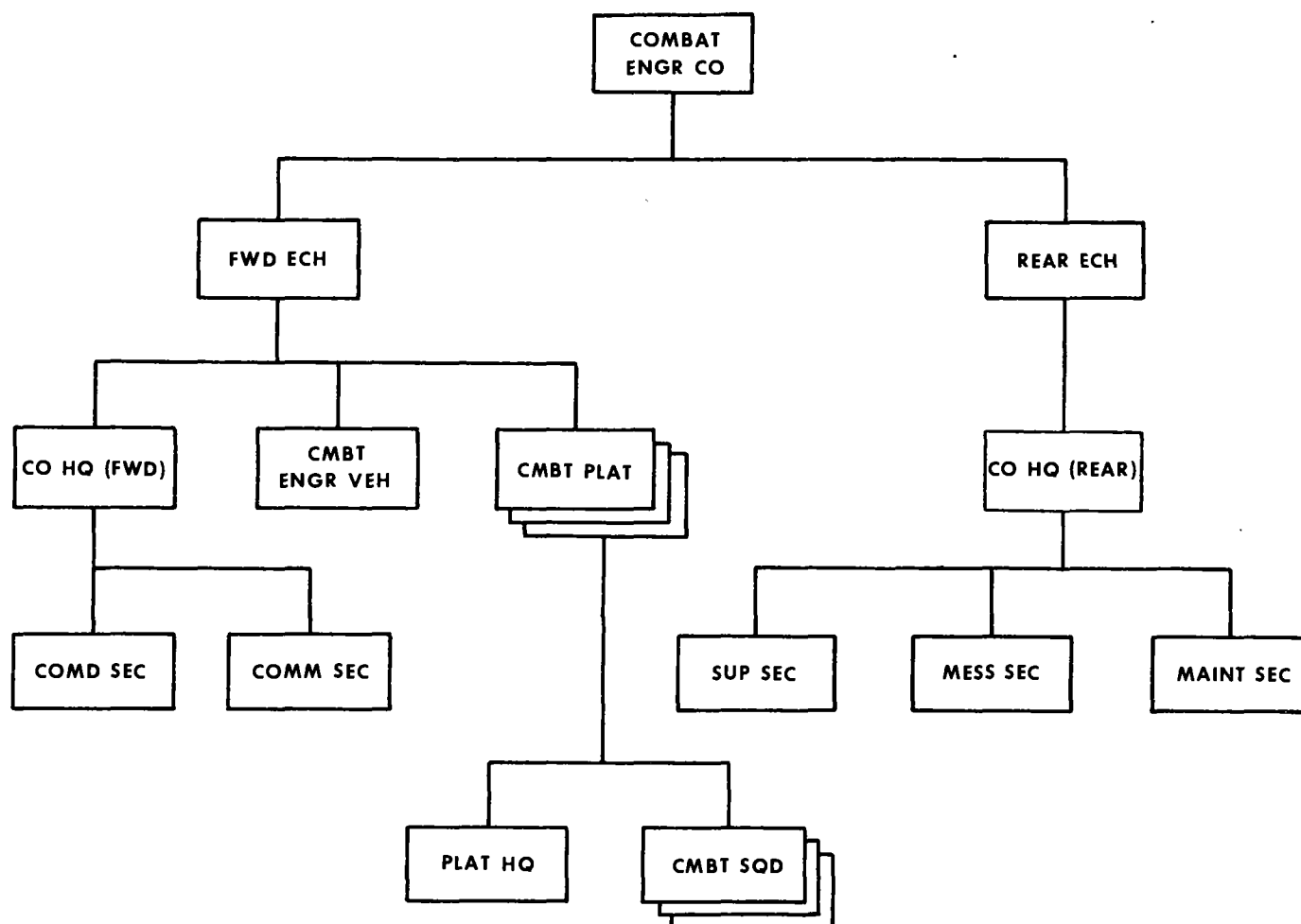


Figure 8-3. Combat engineer company reorganized for combat.

CHAPTER 9

COMMUNICATIONS

9-1. Introduction

a. The Division Signal Battalion installs, operates and maintains the division communication system for support of division level functions including command and control, intelligence, fire-power and combat service support. The system is composed of a number of command and forward area signal centers interconnected by multi-channel communications links, ground and air messenger service and radio/wire integration stations (FM 11-50).

b. The division communication system normally will consist of—

(1) Signal centers at division main, alternate, rear Support Command and three sites in the forward area of the division zone. Each signal center provides message center, messenger, cryptographic, teletype, telephone, and radio (excluding internal radio nets) service for all units in their vicinity. This support is supplemental to the organic capability of the supported unit.

(2) Multichannel communication links to interconnect the signal centers, headquarters division artillery, and headquarters of each brigade.

(3) A division ground messenger service and air messenger service, linking echelons of the division headquarters with the major subordinate commands of the division.

(4) Radio wire integration stations at each signal center, except the one at division rear, capable of interconnecting mobile FM radio stations with the telephone system at signal centers.

c. The signal centers provide points of entry into the system for the supported headquarters, units, and installations to facilitate their use of trunk lines and channels in the system. For instance, if a company commander of an engineer company attached to a brigade has to request specialized equipment from the engineer battalion, he may enter the communications system through the signal center nearest him by either FM radio or telephone.

9-2. Responsibilities

a. Each commander is responsible for the establishment, operation, and maintenance of the communication system of his command. Effective communication is essential to the control of the battalion and its elements. The battalion uses a combination of radio, radioteletype, on line teletype, wire, visual, sound, and messenger communications.

b. Effective communication is a result of the joint effort of units concerned, even though one of those units has primary responsibility for establishing and maintaining communications with another. In the event of a communications failure, units concerned take immediate action to locate and eliminate the trouble and continue such action until contact is regained.

c. Battalion headquarters includes a communications section. The section operates under the immediate supervision of the communications officer, a member of the battalion staff. The communications section provides the following services:

(1) Supervises the operation of the battalion communications system.

(2) Installs wire line to companies and staff sections.

(3) Operates the battalion message center and switchboards and provides messenger service.

(4) Operates panel displays and message pickup facilities.

(5) Operates the battalion command net (FM—Frequency Modulated).

(6) Operates in the division general purpose net (RATT—Radio Teletypewriter).

(7) Provides organizational maintenance of communications equipment of headquarters company, and assists the companies in performance of their maintenance.

(8) Provides facilities for encrypting and decrypting messages.

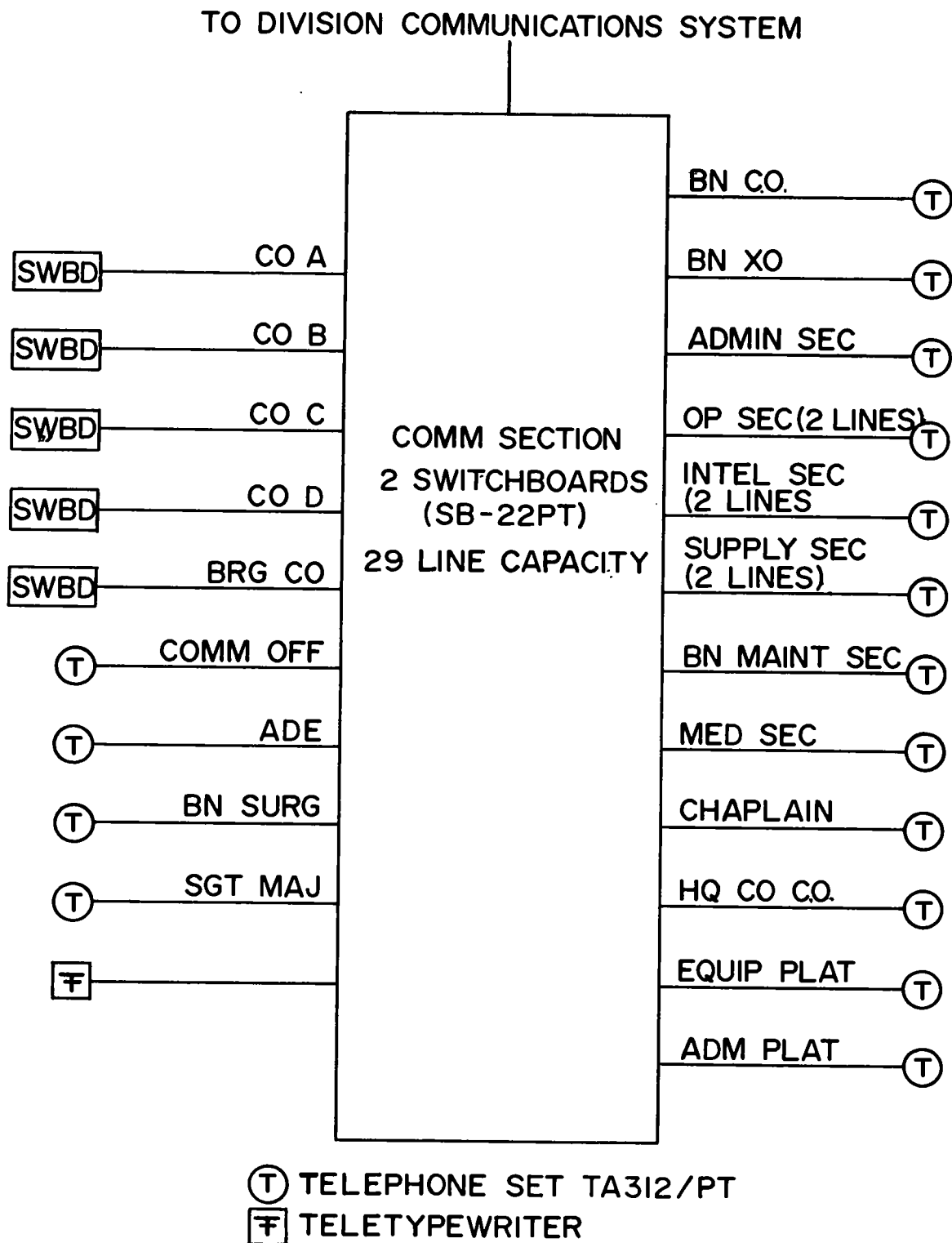
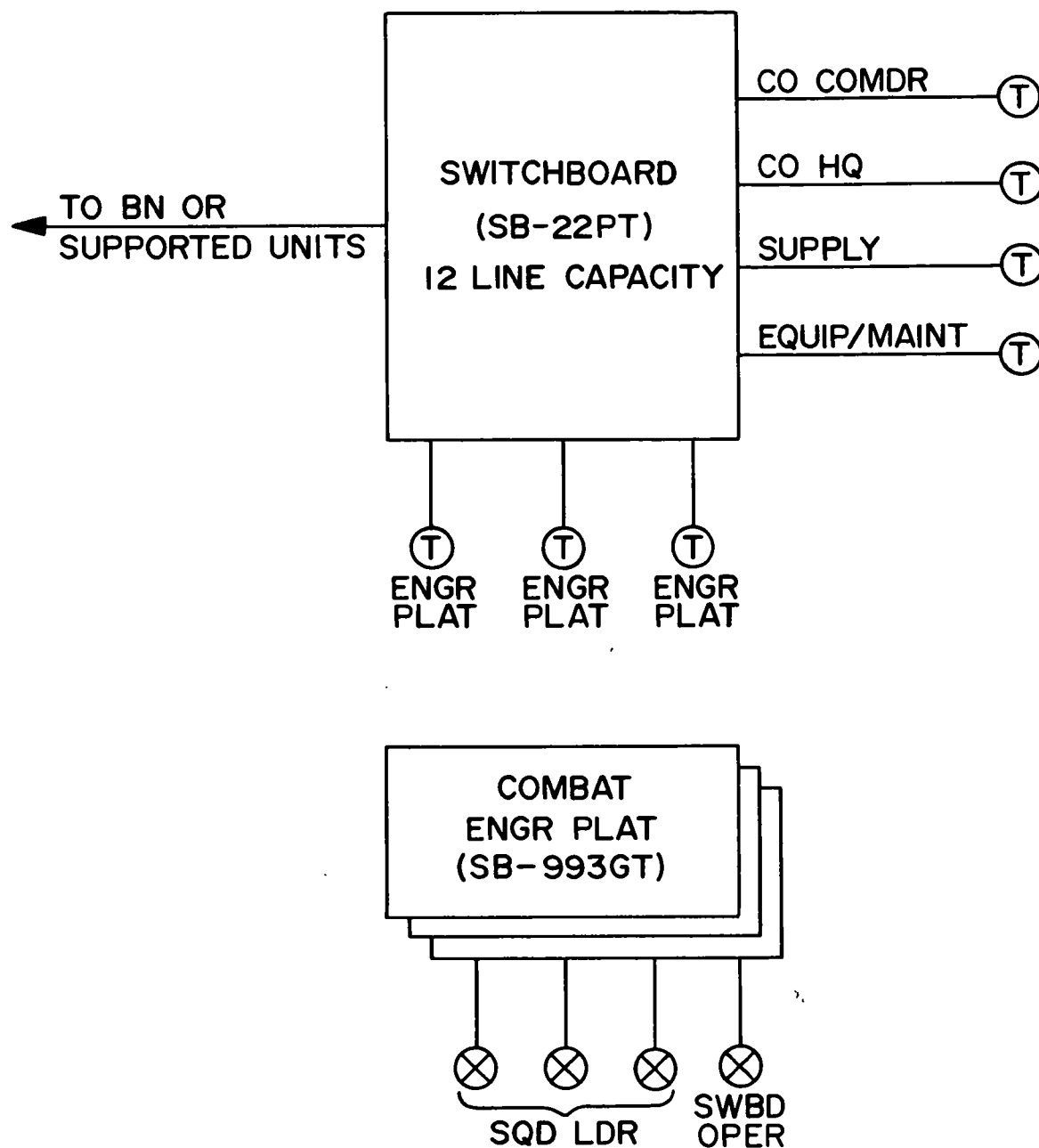


Figure 9-1. Typical wire net for divisional engineer battalion.

d. Each engineer company commander is responsible for the installation, operation, and maintenance of his portion of the communications system. He insures that his subordinates are pro-

perly trained to assist him in the execution of his communications responsibilities. The communications chief is the principal assistant to the company commander in communications matters.



(T) TELEPHONE, TA-312/PT

(X) TELEPHONE, TA-1/PT

Figure 9-2. Typical wire net for combat engineer company.

Company headquarters is authorized personnel to perform the following tasks:

(1) Providing organizational maintenance on radios and radio related equipment of the company.

(2) Supervising the operation of the company communications system.

(3) Installing wire lines to platoons.

(4) Operating the company message center and switchboard.

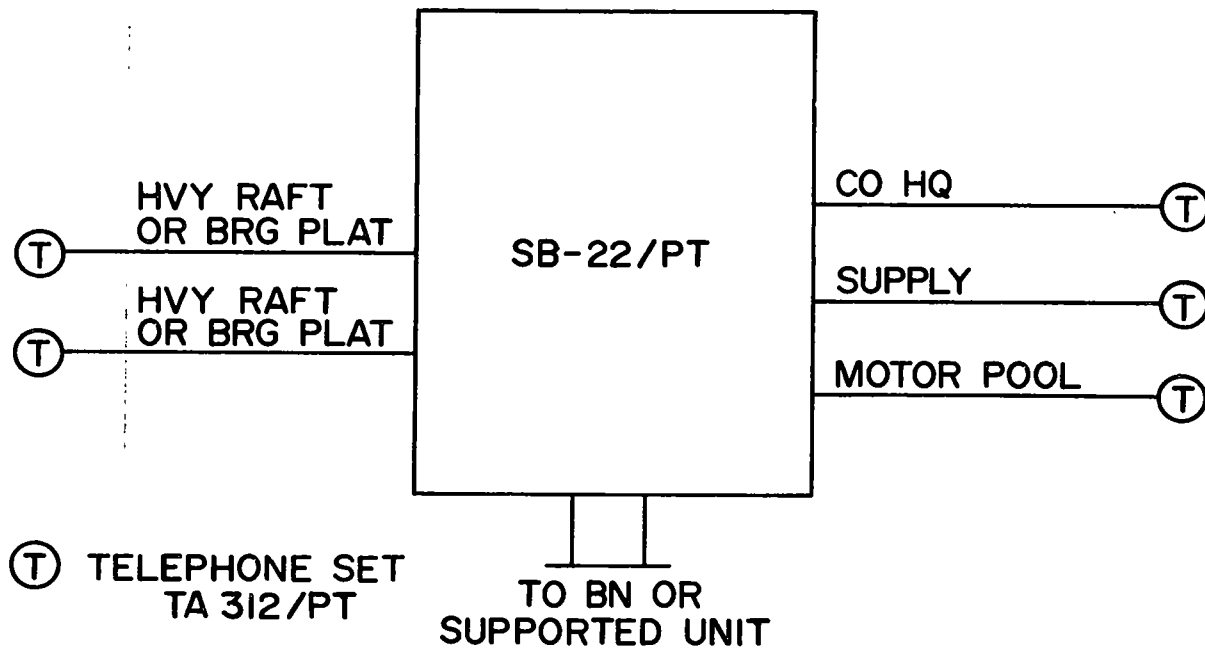


Figure 9-3. Typical wire net for bridge company.

(5) Operating the company net (FM) and operating in the battalion command net (FM).

(6) Monitoring either the engineer battalion commander's net (FM) or the supported organization commander's net (FM).

(7) Encrypting and decrypting messages.

9-3. Wire Communication

a. The widely dispersed operations of the engineer battalion preclude extensive use of organic wire for communication among elements of the battalion other than connections to the nearest division signal center(s). Typical wire nets for the battalion are shown in figures 9-1, 9-2, and 9-3.

b. The battalion communications section installs local telephones required for the operation of the battalion headquarters.

c. Engineer companies enter the wire system of the supported organization and the division area communication system. Wire communication is provided at worksites as required. Units use wire communication to control traffic through minefields and barriers.

9-4. Division Nets

a. *Divisional General Purpose Net.* This is an AM, RATT net that links division main and the engineer battalion. This net also includes division

alternate, division rear, support command, the aviation battalion (Infantry Division only), and the three forward area signal centers. The net control station (NCS) is at the division main command post. The engineer battalion communications section operates an AN/GRC-142 in this net.

b. *Division CG/Command Net.* This is an FM voice net. It links the division commander and staff and the commanders of all immediate subordinate units. The division engineer operates in this net and the assistant division engineer officer monitors it.

9-5. Battalion Nets

Engineer Battalion Command Net (FM). The battalion command net links elements of the battalion over the ranges expected during normal operations. Command, operational, intelligence, and logistical traffic are carried on this FM net. It is the primary communication means for the battalion. It is primarily for the use of the battalion command and control. When a company is supporting another organization, the company commander's and the company headquarters' FM radios normally monitor this net, and operate in the supported organization commander's command net (FM). Figure 9-4 is a schematic of typical nets for the engineer battalion of an infantry division. The net for engineer battalions

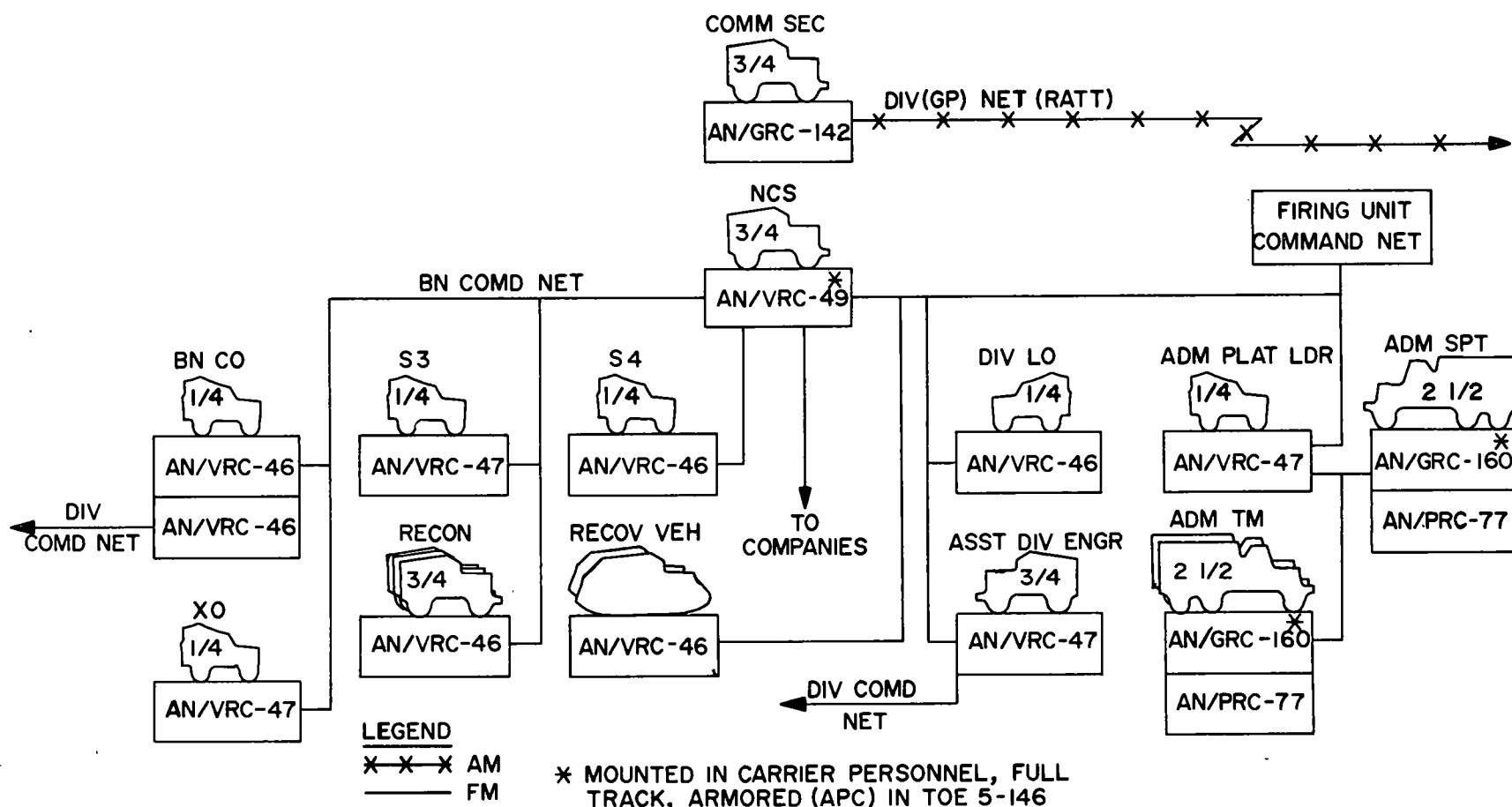


Figure 9-4. Radio net, engineer battalion, infantry division.

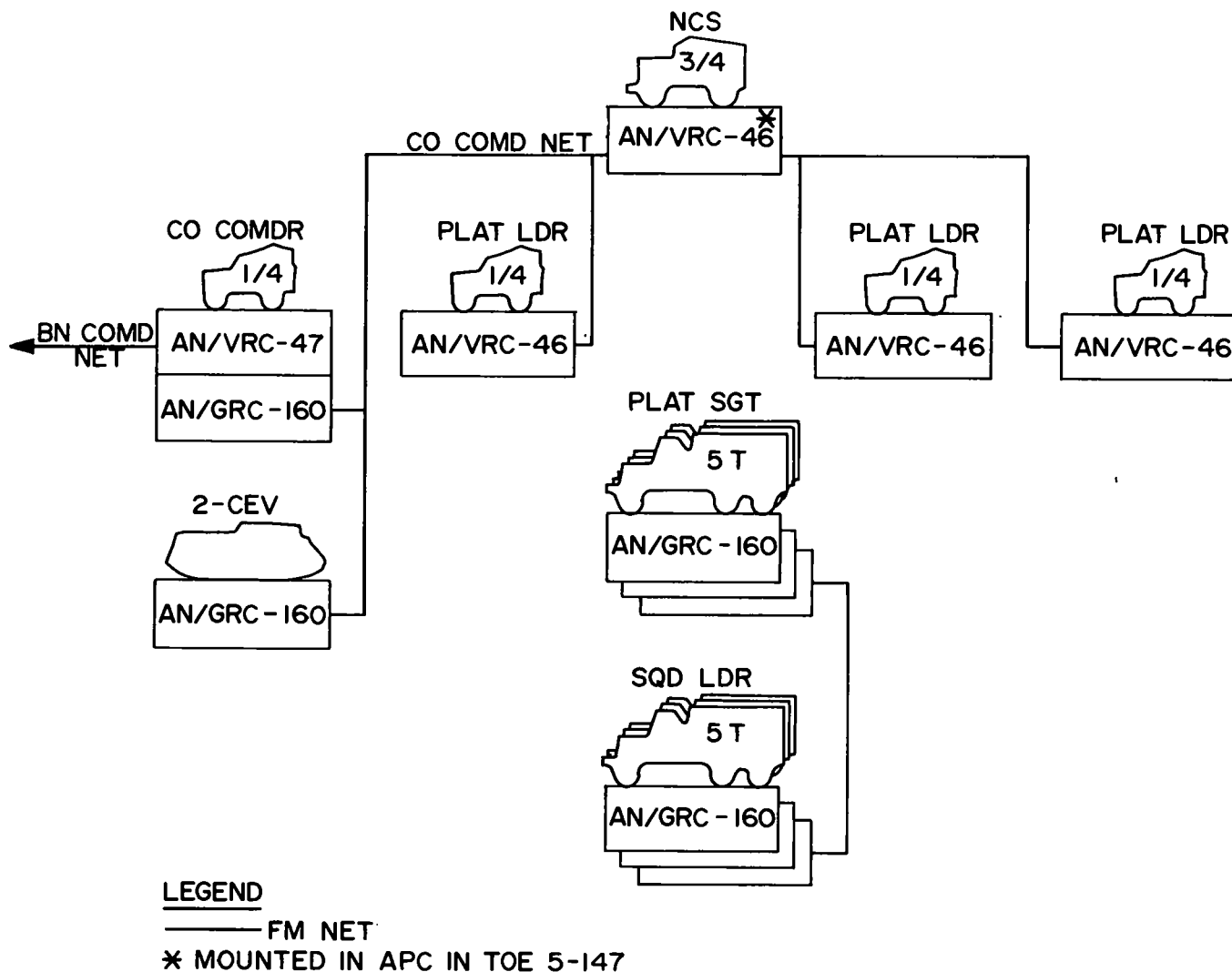


Figure 9-5. Radio net, engineer company, engineer Battalion, infantry division.

of the armored and mechanized divisions are similar.

9-6. Company Nets

a. Organic equipment of the combat engineer companies and the bridge company provides FM radios for internal command and control and for contact with the supported unit. Combat engineer companies of the armored and mechanized infantry division battalions operate a similar net. Figure 9-6 is a typical net for the bridge company when equipped with the M4T6 or class 60 bridge. A slightly different net is used when the company is equipped with the MAB.

b. The communications section of the company headquarters operates the net control station

(NCS) for the company command net. The FM radio set has two receiver-transmitters (RT). Normally, one RT is used to control the company command net. The other receiver-transmitter is used to operate in the engineer battalion commander's net or, if the company is in a support role, it operates in the supported organization commander's net.

c. The company commanders' radio is used to maintain contact with his subordinate elements and monitor the battalion net or that of the supported organization commander.

d. The platoon radio communication capabilities are as follows:

(1) The platoon leaders of the combat engineer companies can operate in two nets. One is

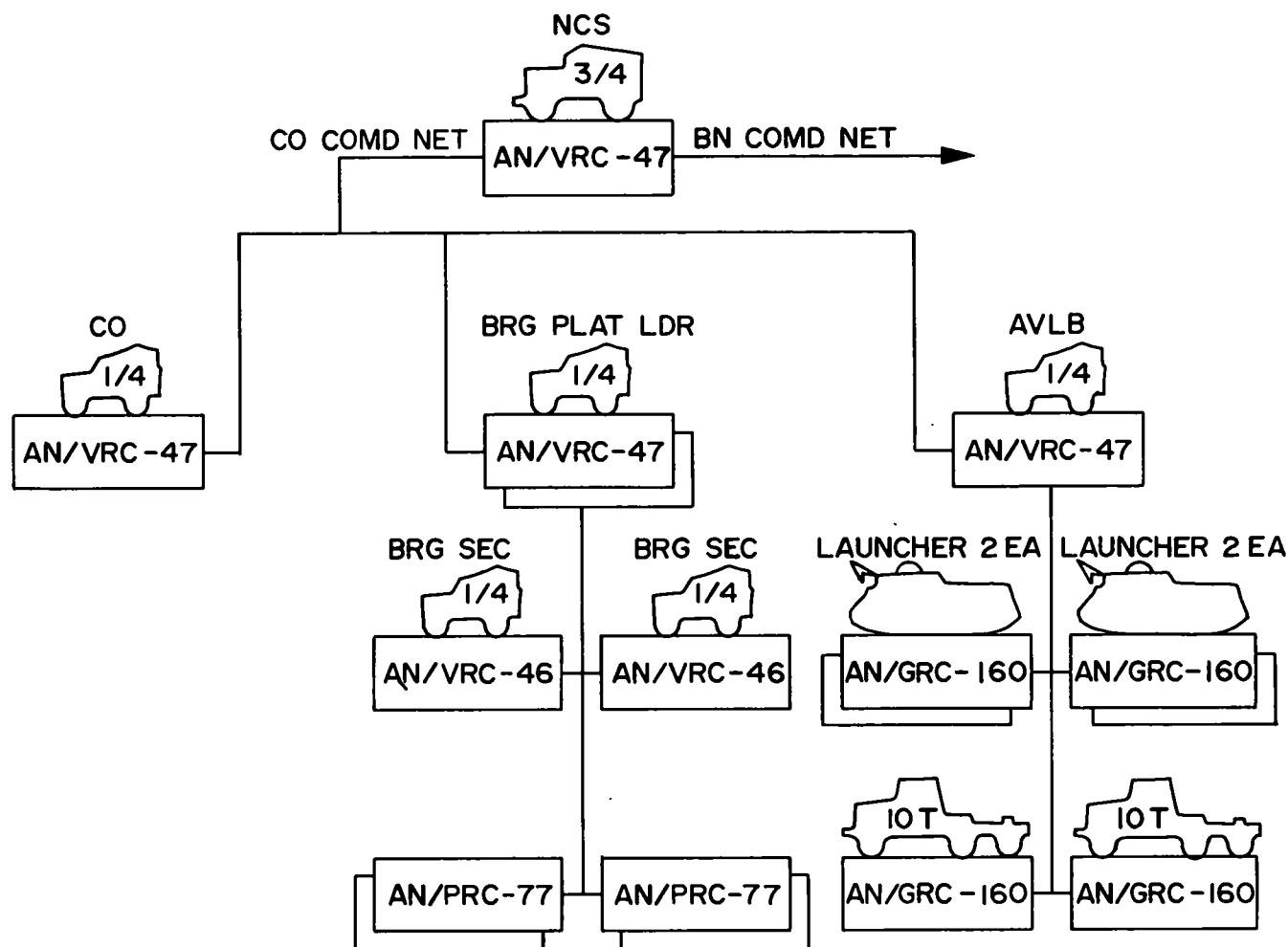


Figure 9-6. Radio net, bridge company, divisional engineer battalion (equipped with M4T6 or class 60 bridge).

the company command net or, if the platoon is in a support role, the supported organization commander's net; the other is the platoon net.

(2) The platoon leaders of the bridge company have radios similar to those in company headquarters. Employment of radios in the platoon is the same as in the combat engineer platoons.

e. The combat engineer vehicles of the engineer companies and the armored vehicle launched bridge launchers of the bridge company operate

in their respective units' net, except when in a support role, at which time they operate in the supported unit's net.

9-7. Radio Communication With Supporting Engineer Units

Nondivisional engineer combat units of the engineer combat groups use FM radios for their primary means of radio communication. A supporting engineer unit normally establishes and maintains communication with the supported divisional engineer battalion.



CHAPTER 10

COMBAT SERVICE SUPPORT

SOLOG 125

10-1. Introduction

This chapter covers the method by which the divisional engineer battalion receives its combat service support within the division. Additionally, it covers the administrative, logistical and maintenance areas of responsibility within the battalion as well as the battalion's responsibility to the division for production of potable water. The procedures described herein are intended as a guide and are subject to modification by appropriate regulations, directives, and policies of higher headquarters.

a. Division Support Command. The division has, as a major subordinate unit, a division support command which is organized on a functional basis to provide division level combat service support. It provides the following support to all elements of the division: supply, transportation of supply (less class V), direct support maintenance (except medical, cryptographic, and quartermaster air equipment), medical service, and miscellaneous services. Direct support maintenance of medical and quartermaster air equipment is provided by field army support command (FASCOM) units. Direct support maintenance of cryptographic equipment is provided by the division signal battalion. The division support command is an operational command directly under the division commander (FM 54-2). Detailed functions and procedures pertaining to subordinate units of the division support command are covered in separate field manuals.

b. Division Administration Company. The division administration company, organic to the division support command, provides the necessary personnel and administrative services to sustain the division. This includes replacement support and a centralized personnel service for all units assigned and attached to the division. It also provides direct support maintenance of electric accounting machine equipment. The company operates under the general staff supervision of the

division G1. For details of the employment of the administrative company, see FM 61-100.

10-2. Administration

a. Administrative Responsibilities. Administrative responsibilities within the battalion include maintenance of unit strength; submission of reports; provision of morale and personnel services; discipline, law and order; and collection and evacuation of the dead and of prisoners of war.

b. Maintenance of Unit Strength. The battalion adjutant forwards personnel requisitions to the division adjutant general, using as a basis vacancies existing in the companies. Receipt and processing of these individual replacements into the battalion is supervised and coordinated by the adjutant. In the interest of morale and efficiency, replacements are retained in the division replacement section for the shortest practicable time, about 48 hours. They are moved to the battalion under battalion escort, using either unit or division transportation. Here they receive further indoctrination in the history, traditions, mission, and current situation of the battalion. Replacements are then moved to their assigned companies.

c. Submission of Reports. The companies informally furnish the battalion adjutant with necessary information for the company morning report, the personnel daily summary report, and, when required, a casualty and loss report. This information is relayed to the division administration company through the S1 section. The personnel staff NCO in the S1 section of battalion maintains close liaison with the division administration company on these and other personnel matters. The battalion adjutant keeps the commander informed concerning personnel policies of higher headquarters and advises him on matters of personnel, morale, discipline, and esprit de corps within the battalion.

d. Morale and Personnel Services. The company commander is responsible for the morale and welfare of members of the company. He insures that leave and rest quotas are equitably allocated and that these quotas are filled when conditions permit. Emergency leaves are processed expeditiously in accordance with regulations and policies. He insures that all personnel are familiar with awards and decorations policies and that draft recommendations are promptly forwarded to battalion for preparation in final form. He insures that the pay and allotment of his men is correct, that the mail is promptly delivered and properly handled, and that services such as legal assistance, welfare, army exchange, special services, and chaplain's assistance are made available and are properly utilized. The battalion adjutant assists the company commander in the foregoing responsibilities and insures the overall efficient operation of these services throughout the battalion.

e. Discipline, Law, and Order. The company commander is responsible for all matters pertaining to discipline, law, and order within the company. When appropriate, he exercises jurisdiction under Article 15, Uniform Code of Military Justice, or prefers charges. Charge sheets and allied papers normally are prepared by clerks of the battalion S1 section from information furnished by the company commander. The battalion commander exercises summary and special court-martial jurisdiction. He appoints court-martial boards for prompt disposition of cases occurring within the organization. The battalion adjutant maintains statistics on all absences without leave, stragglers, awards and punishments, court-martial actions, and other matters reflecting the status of discipline law and order within the command. He maintains records to insure that corrective action is taken when required.

f. Collection and Evacuation of the Dead. The company commander is responsible for collecting, identifying, and evacuating the dead, and for safeguarding their personal effects, while in the area of his control. The dead are identified as early and as fully as possible. Deceased personnel normally are evacuated to the battalion or supported organization's graves registration and evacuation point on available transportation. Personal effects are not removed from the body. Isolated burials are resorted to only as an emergency measure. When isolated burials are authorized, they are fully documented and reported promptly through graves registration channels. Details

of graves registration service are covered in FM 10-63.

g. Collection and Evacuation of Prisoners of War. The company commander is responsible for the proper handling of prisoners of war in accordance with the Geneva Convention of 1949 and for their evacuation to a prisoner of war collecting point. The adjutant prepares and supervises the executions of plans for the collection and evacuation of prisoners of war. He must be careful to insure that these plans conform to the directives of higher headquarters and that they are sufficiently comprehensive. He coordinates with S2 for estimates on prisoners anticipated and facilities for any interrogation desired, and with S3 for necessary guards for prisoners while they are being evacuated. He coordinates with S4 for transportation to evacuate prisoners of war and with the battalion surgeon for evacuation of wounded prisoners.

10-3. Supply Functions

The principal functions performed by the battalion in supply matters are those of acquisition and evaluation. The battalion draws supplies from supporting units and makes distribution within the battalion. It also takes excess or unserviceable supplies from subordinate units and disposes of them through prescribed channels. The property responsibilities of the commanders are identical with those of commanders at all echelons. These command responsibilities are to insure that all property pertaining to the command is adequately administered, safeguarded, accounted for, and used.

10-4. Supply Responsibilities

a. Battalion Commander. The battalion commander discharges his supply responsibilities through the supply staff officer (S4). He insures that commanders of subordinate units properly conduct supply functions within their commands. He checks on the efficiency of supply operations through frequent personal inspections and by reports of inspections turned in by his S4. Immediate action to correct supply problems or discrepancies found as a result of inspections is the responsibility of the commander. He must insure that his staff accomplishes proper corrective action.

b. Battalion Supply Officer (S4). The battalion supply officer (S4) is responsible for closely supervising the supply activities of all subordinate units. He maintains informal accountability for

all military property in the possession of these units. His operations support the tactical plan and are based upon the orders of higher headquarters. He has primary staff responsibility for the provision of ADM and associated equipment and functions as the division water supply officer. He coordinates with the other staff sections of the battalion, the S4 or G4 of the next higher headquarters, and all supply establishments which are his sources of supply. He also coordinates and establishes liaison with all maintenance agencies which support the battalion. The primary functions of the S4 include—

(1) Supervising the battalion supply section and maintenance section.

(2) Maintaining liaison with installation supply and maintenance activities.

(3) Training supply personnel.

(4) Providing guidance to unit commanders on problems concerning supply.

(5) Informing the battalion commander on the status of supply operations within all elements of the command.

(6) Establishing and maintaining the property books and property records for the battalion and its elements. Duties of the property book officer are normally assigned to the supply warrant officer and include—

(a) Maintaining battalion and installation property books.

(b) Maintaining a transaction register to reflect all supply actions initiated by the battalion.

(c) Initiating all supply requisitions and turn-ins.

(d) Preparing adjustment transactions as required.

(e) Maintaining a file of vouchers to support property book and transaction register entries.

c. Company Commander. The company commander is responsible for the supply and administration of the company and any attached elements. He makes timely requests for supplies and distributes them. The company commander is assisted in these duties by the company officers, the first sergeant, the mess steward, the supply sergeant, and the motor sergeant. The specific responsibilities of a company commander in connection with property administration are quite extensive. He must—

(1) Have in his possession, in serviceable condition, all items authorized his company.

(2) Determine by frequent inspection that all prescribed items of authorized equipment in the possession of officers or enlisted men are on hand and serviceable.

(3) Insure that all personnel, both officer and enlisted, are instructed in the proper methods of use, care, and maintenance of property, and that the instructions are followed.

(4) Maintain individual clothing records, and such other records as are necessary to assure that the status of the property for which he is responsible is accurately reflected at all times.

(5) Obtain acceptable vouchers to cover loss, damage, or destruction to property for which it is responsible, and process these vouchers in accordance with appropriate regulations.

(6) Upon transfer of property responsibility to his successor, take joint inventory, and initiate action to adjust discrepancies.

(7) When desired, designate one or more authorized representatives to receipt for property in his name. The representative may be any member of his command, commissioned, warrant, or enlisted. The fact, however, that property is receipted for by a representative of the commander does not in any way reduce his own responsibility for the property.

(8) Assume responsibility for all government property under his control, whether receipted for or not.

d. Platoon Leader. The platoon leader is responsible for the equipment organic to his platoon. This equipment is issued to him by the battalion S4. He inspects the platoon to see that it is properly equipped and that any shortages are replaced. He insures that the platoon is fed, and that supplies and materials are replenished. He informs the company commander of any discrepancies. He checks on the timely delivery of replacement items.

10-5. Supply Procedures

a. Maps. Distribution of maps is accomplished by the supply and transportation battalion in accordance with priorities of allocations made by the G2, in coordination with the engineer battalion S2 and the division G3. Quantities are based on army tables of map allowances. The engineer battalion S2 obtains and distributes maps for the battalion.

b. Class I Supply. Normally, the division adjutant general provides the division supply office

with estimated strength figures for the division. Using those figures, the division supply officer prepares the division daily ration request and dispatches it to the corps support brigade supporting the division. In unusual circumstances, the battalion S4 may submit daily ration requests to the division supply office. Normally, rations are delivered to the supply and transportation battalion, which breaks down the bulk supplies into unit lots. Depending on whether unit or supply point distribution is in effect, the supply and transportation battalion delivers rations to the engineer battalion area or the engineer battalion uses its organic transportation to pick up the rations at the prescribed class I distributing point. In either case, the battalion S4 breaks down and distributes rations to the company kitchens. When companies are in support of brigades and time and distance make this method of supply infeasible, the battalion S4 and the company commander concerned make appropriate arrangements with the division support command commander and the S4 of the supported brigade.

c. Class II Supply. Class II supplies, clothing, tentage, organizational tool sets and kits, handtools, administrative, housekeeping supplies and equipment are handled by the supply and transport battalion. The engineer battalion S4 forwards the battalion requirements directly to the supply and transport battalion. Fast moving class II supplies are forwarded directly from the army supply points or depots to the division class II distributing point in the division area or, where appropriate, directly to the battalion or company. Unit distribution of fast moving class II items directly to the battalion or to elements of the supply and transportation battalion operating with the brigade trains is desirable. Normally, a combination of unit and supply point distribution will be employed.

d. Class III Supply. The battalion S4 submits a periodic forecast for POL products to the supply and transportation battalion, indicating any change to the previously experienced supply rates. Class III may be delivered to the engineer battalion area by tankers of the supply and transportation battalion, or the engineer battalion may use its trailer-mounted fuel tanks to draw vehicle fuel from the class III distributing points which are established normally by the supply and transportation battalion in the division support and brigade trains areas. Individual vehicles moving to the rear on other tasks habitually replenish their fuel at division mobile filling stations.

e. Class IV Supply. Construction materials including installed equipment and all fortification barrier materials are normally delivered by the army supply points supporting the division and are carried as far forward as possible without transshipment. The battalion S4 forwards the battalion requirements directly to the supply and transport battalion.

f. Conventional Class V Supply. Ammunition requisitions for class V are prepared by the battalion S4 and are presented at the division ammunition office for authentication by the division ammunition officer (DAO) who normally is located in the division support area. He may be located at the army ammunition supply point (AS-SP). Class V normally is supplied through supply point distribution. The battalion does not carry a reserve class V. The only ammunition held in the battalion is in the company basic loads. Supply procedures are described in FM 9-6. (Ammunition supply procedures for the Divisional Engineer Battalion must include provisions for increased rate of ammunition supply when they fight as infantry).

g. Special Class V Supply. Special ammunition supply procedures are described in (S) FM 101-10-3 and FM 9-6.

h. Class VI Supply. Personal demand items (non-military sales items will normally be available where the combat situation permits and when authorized by division headquarters.

i. Class VII Supply. Major end items, such as tanks, mobile machine shops, and vehicles, are delivered as authorized and requested by the division support command.

j. Class VIII Supply. Medical material, including medical peculiar repair parts are handled by the medical battalion. Divisions draw their medical supplies from the advance platoon supporting the corps to which the divisions are attached.

k. Class IX Supply. Repair parts and components (less medical peculiar repair items) are supplied by the division maintenance battalion. This class includes all repair parts and components, kits, assemblies, subassemblies, repairable and nonrepairable, required for maintenance support of all equipment.

l. Class X Supply. Class X supply includes material required to support non-military programs such as agriculture and economic internal deve-

lopment programs within a host country which is not included in Classes I-IX.

10-6. Water Purification (SOLOG 125) (Appendix E)

a. Water Production Teams. Within the battalion S4 section there are five water production teams equipped with five water purification sets, organic transportation and sufficient personnel to operate and maintain equipment. Under the staff supervision of the S4, these teams produce potable water for the division. Normally, one team provides area support in each brigade area base, one team provides area support in the division area base, and one is kept in reserve. Whether sent to a specific location or attached to an engineer company, the team operates alone. The location of the team determines how it gets its rations. It may be attached to an adjacent unit for rations; rations may be delivered to it by the engineer company to which it is attached or by headquarters company; or the team may prepare its own food on small cooking units.

b. Water Points. With the water purification sets, the water production teams establish the water points required by the division. Each unit of the division draws water from the point nearest it. Water point locations are reported to the supported brigade and to the engineer battalion headquarters. Battalion, in turn, reports these locations to the G4.

c. Sources of Water. Water usually is obtained from local sources determined by reconnaissance by S2 personnel. It is made potable with water purification equipment organic to the engineer battalion. When a source of water is not available in the division area, the division engineer has the staff responsibility for obtaining water elsewhere and stocking it at division water points.

d. Operation of Water Points. The tactical situation and the sources of water normally dictate the location and hours of operation of water points. Road nets, parking areas, and concealment are only slightly less important considerations. Normally, units are permitted to draw water at any time the water point is in operation. If water is limited in quantity or the demand excessive, units may be permitted to draw water only at scheduled times. Normally, the G4 establishes these schedules. Units should draw water as soon as practicable after the opening of the water point, as the water purification

equipment must be dismantled before the next move in time to accompany the force which it is supporting. The battalion S4 is responsible for coordination of displacement of water points with the water point teams and with G4 for closeout times of old points and opening times and locations of new points; and for coordination with the battalion S3 for preparation of water point sites, with the division surgeon for water purity control, and with the provost marshal for traffic control.

10-7. Maintenance

a. Organizational Maintenance. The battalion maintenance section, under the control of the maintenance warrant officer, insures that the organizational maintenance requirements of the battalion are satisfactorily met. Incoming repair work is checked to see if proper operator maintenance has been performed and to determine the extent of repairs needed. Completed work is checked to see that equipment is in operating condition before it is released from the maintenance section shop. The battalion maintenance section also provides technical help to company motor pool personnel.

b. Direct Support Maintenance. The maintenance battalion of the support command provides direct support maintenance for all material except medical, electric accounting, quartermaster air, and cryptographic equipment. Normally, one forward support company is placed in support of each brigade and operates in the brigade trains area. It provides direct support maintenance for construction, tank-automotive, and electric equipment for the units in the area. The forward support company has a limited materiel recovery and evacuation capability. The main support company operates in the division support area, providing direct maintenance support to the division elements not supported by the forward support companies, and backup maintenance support to the forward support companies. The battalion maintenance section requisitions repair parts from the support company designated. The basis of requisition will be to replenish its prescribed load of repair parts.

c. Evacuation of Damaged Material. Units of the battalion are responsible for initial recovery of damaged equipment. Large items such as cranes or other vehicles may be evacuated to the brigade axis of evacuation or to division collection points. Small items are evacuated to the col-

lection points. The main support company of the maintenance battalion operates the main division

collection point and provides evacuation service for the materiel supported.

APPENDIX A

REFERENCES

A-1. Army Regulation

350-1 Army Training.

A-2. Field Manuals (FM)

3-12 Operational Aspects of Radiological Defense.
 5-1 Engineer Troop Organizations and Operations.
 5-15 Field Fortifications.
 5-20 Camouflage.
 5-25 Explosives and Demolitions.
 5-26 Employment of Atomic Demolition Munitions (ADM).
 5-30 Engineer Intelligence.
 7-10 The Rifle Company, Platoons and Squads.
 7-20 The Infantry Battalions.
 7-30 The Infantry Brigades.
 9-6 Ammunition Service in the Theater of Operations.
 10-63 Handling of Deceased Personnel in Theaters of Operations.
 11-50 Signal Battalion, Armored, Infantry, and Infantry (Mechanized) and airmobile Divisions.
 17-1 Armor Operations.
 21-5 Military Training Management.
 21-40 Chemical, Biological, Radiological, and Nuclear Defense.
 21-41 Soldiers' Handbook for Defense Against Chemical and Biological Operations and Nuclear Warfare.
 21-48 Chemical, Biological, and Radiological (CBR) and Nuclear Defense Training Exercises.
 30-5 Combat Intelligence.
 30-10 Terrain Intelligence.
 31-16 Counterguerrilla Operations.
 31-22 U.S. Army Counterinsurgency Forces.
 31-23 Stability Operations—U.S. Army Doctrine.
 31-50 Combat in Fortified and Builtup Areas.
 31-60 River-Crossing Operations.
 33-1 Psychological Operations—U.S. Army Doctrine.
 33-5 Psychological Operations Techniques and Procedures.
 54-2 The Division Support Command and Separate Brigade Support Battalion.
 61-100 The Division.
 (S) 101-10-3 Staff Officers' Field Manual; Organizational Technical and Logistical Data—Classified Data (U).
 101-31-1 Staff Officers' Field Manual; Nuclear Weapons Employment Doctrine and Procedures.

A-3. Technical Manuals (TM)

5-210 Military Floating Bridge Equipment.
 5-330 Planning, and Design of Roads, Airbases, and Heliports in the Theater of Operations.

A-4. Army Training Programs (ATP)

- | | |
|-------|--|
| 5-25 | Engineer Combat Units. |
| 5-114 | Engineer Battalion and Construction Support Units. |

A-5. Table of Organization and Equipment (TOE)

- | | |
|-----------|---|
| TOE 5-145 | Engineer Battalion, Armored Division or Engineer Battalion, Infantry Division (Mechanized). |
| TOE 5-146 | Headquarters and Headquarters Company Engineer Battalion, Armored Division or Headquarters and Headquarters Company Engineer Battalion, Infantry Division (Mechanized). |
| TOE 5-147 | Combat Engineer Company Engineer Battalion, Armored Division or Combat Engineer Company Engineer Battalion, Infantry Division (Mechanized). |
| TOE 5-148 | Bridge Company Engineer Battalion, Armored Division or Bridge Company Engineer Battalion, Infantry Division or Bridge Company Engineer Battalion, Infantry Division (Mechanized). |
| TOE 5-155 | Engineer Battalion, Infantry Division. |
| TOE 5-156 | Headquarters and Headquarters Company Engineer Battalion, Infantry Division. |
| TOE 5-157 | Engineer Company Engineer Battalion, Infantry Division. |

APPENDIX B

RECOMMENDED OUTLINE FOR AN SOP

Standing Operating Procedure

Hq. Engr Bn
 APO, U.S. Army
 DATE

Section I. INTRODUCTION

1. APPLICATION (to operations, relations to prior SOP's, lower units to conform).
2. PURPOSE
3. REFERENCES (AR's, FM's, and TM's)—Annex A.
4. RESPONSIBILITY FOR SOP (preparation, changes, and revisions).
5. EFFECTIVE DATE

Section II. COMMAND, STAFF, AND LIAISON

6. ORGANIZATION
 - a. Normal.
 - b. Special Internal Attachments and Organization.
 - c. Normal and Special External Attachment and Support (brigades, task forces, etc.).
7. COMMAND POSTS
 - a. Normal location (in relation to the next higher headquarters).
 - b. Reporting Change of Location (coordinates and time).
 - c. Forward CP's.
 - (1) When (situation for which required).
 - (2) How organized.
 - (3) Personnel and equipment.
8. STAFF DUTIES
 - a. Duties That Are Special or Additional to Those in FM 5-1 and FM 101-5.
 - b. Duties of Such Other Important Special Staff Officers as the Commander Desires To Prescribe (paragraph for each).
9. LIAISON (FM 5-1 and FM 101-5)
 - a. Duties of Liaison Officers.
 - b. Responsibilities of Liaison (with next higher, lower, and adjacent units).

Section III. ADMINISTRATION

10. GENERAL (Channels) (FM 100-10)
11. REPORTS
 - a. Routine.
 - b. Special.

- c. Information Concerning Submission of Reports-Annex B.
 - (1) Title and reports control symbol.
 - (2) Form of report.
 - (3) Date due.
 - (4) Number of copies.
 - (5) Negative report required or permissible.
- 12. PROMOTIONS (policies)
 - a. Officer.
 - b. Enlisted.
 - c. Battlefield.
- 13. COURTS-MARTIAL (MCM, US 1951)
 - a. Local Jurisdiction.
 - b. Procedure for Submitting Charges.
- 14. MAIL
 - a. Handling Official Mail.
 - b. Handling Personal Mail.
- 15. LEAVES AND PASSES
 - a. Policy of Command (frequency, conduct, etc.).
 - b. Authority To Grant.
- 16. JOURNALS AND HISTORY (AR 220-15)
 - a. Responsibility for Unit Journal and History.
 - b. Maintenance of Staff-Section Journals.
- 17. DISTRIBUTION OF MILITARY PUBLICATIONS (AR 310-1)
- 18. HANDLING PRISONERS OF WAR
 - a. Reference to FM 19-40 and FM 27-10.
 - b. Special Instructions for Capturing Units.
- 19. AWARDS AND DECORATIONS
 - a. Channels.
 - b. Forms.
 - c. Presentations.
- 20. ORDERS (FM 101-5)
 - a. Combat Orders.
 - b. Memoranda of Combat Orders to S3.
- 21. BILLETTS AND ASSEMBLY AREAS
 - a. Billeting Policies (occupation and vacating).
 - b. Billeting Party (organization and duties).

Section IV. RECONNAISSANCE, INTELLIGENCE,
AND COUNTERINTELLIGENCE

- 22. RECONNAISSANCE
 - a. Reconnaissance a Continuing Function.
 - b. Essential Elements of Engineer Information.
- 23. ENGINEER INTELLIGENCE (FM 30-5)
 - a. Evaluation.
 - b. Preparation of Reports.
 - c. Dissemination.
- 24. COMBAT INTELLIGENCE (FM 30-5)
 - a. Definition of "Spot Report."
 - b. "Spot Report" Required.
 - (1) Initial contact with enemy.

- (2) Marked changes in enemy disposition or situation.
- (3) Attack by enemy ground, aircraft, or airborne forces.
- (4) New units identified.
- (5) Enemy strength, composition, and movement.
- (6) Location of enemy installations.
- (7) Use of chemicals or new weapons.
- (8) New enemy materials or equipment.

25. COUNTERINTELLIGENCE

- a. Mail Censorship.
- b. Blackout Discipline.
- c. Extent of Information Given, if Captured.
- d. Signs and Countersigns.
- e. Destruction of Classified Material.
- f. Civilian Control.
- g. Secrecy Discipline.
- h. Information to Press Representatives.

Section V. OPERATIONS

26. ORDERS (FM 101-5)

- a. Fragmentary Orders.
- b. Written Orders.
- c. Use of Overlays, Tables, and Charts.

27. SECURITY-ANNEX C

- a. Responsibilities of Battalion in Rear Areas.
- b. Responsibilities of Unit Commander.

28. COMBAT

- a. Reorganization for Combat. Annex D.
- b. Responsibility for Contact.
- c. Coordination of Request for Fire Support and Tactical Air Support.
- d. Spot Reports.
- e. Situation Reports.
- f. Minefields.
- g. CBR and Nuclear Warfare. Annex E.
 - (1) Defensive.
 - (2) Offensive.
- h. Smoke.
 - (1) Request for use.
 - (2) Coordination.
- i. Defense Against Air Attack.
- j. Employment of ADM. Annex F.
- k. Bomb and Shell Disposal.

29. MOVEMENT

- a. General.
 - (1) What constitutes a convoy.
 - (2) Required road clearances.
 - (3) Requests for augmented transportation.
 - (4) Loading plan. Annex G.
- b. Responsibilities.
 - (1) S-1.
 - (a) Coordination with civil and military police.
 - (b) Commands quartering party.
 - (2) S-2.
 - (a) Security of bivouac and halt areas.

- (b) Reconnaissance of route.
 - (c) Posting of road guides.
- (3) S-3.
 - (a) Warning order.
 - (b) Movement order.
 - (c) Selects routes.
 - (d) Arranges for road clearances.
- (4) S-4.
 - (a) Arranges for augmented transportation.
 - (b) Responsible for traffic planning.
- (5) Engineer equipment officer. Responsible for Maintenance.
- (6) Company commander.
 - (a) Prepares company loading plan.
 - (b) Furnishes S-3 with lists of vehicles, equipment, and materials.
 - (c) Conducts necessary training for movement.
 - (d) Polices area.
- c. Motor Movement. Annex H.
- d. Rail Movement. Annex I.
- e. Alert Plans.
 - (1) Unit plans.
 - (2) Alert rosters.

Section VI. LOGISTICS

- 30. CLASS I SUPPLY
 - a. Ration Pickup.
 - b. Daily Ration Return and Ration Cycle.
 - c. Reserve Rations Carried.
 - (1) By unit.
 - (2) By individual.
 - d. Responsibility for Attached Units.
- 31. WATER PROCESSING AND PURIFICATION
 - a. Authorized Sources.
 - b. Purification by Expedient Methods.
 - c. Water Economy.
- 32. CLASS II SUPPLY
 - a. Requisition Procedure.
 - b. Pickup Procedure
 - c. Salvage.
- 33. CLASS III SUPPLY
 - a. Requisition Procedure.
 - b. Delivery Procedure.
 - c. Fuel Sources.
- 34. CLASS IV SUPPLY
 - a. Requisition Procedure.
 - b. Pickup Procedure.
 - c. Basic Loads, Annex J.
 - d. Salvage.
- 35. CLASS V SUPPLY
 - a. Requisition Procedure.
 - b. Forms Used and Certificates Required.
 - c. Basic Load.
 - d. Salvage.
- 36. CLASS VI SUPPLY—As directed by Division Commander.

- 37. CLASS VII SUPPLY
 - a. Requisition Procedure.
 - b. Salvage.
- 38. CLASS VIII SUPPLY
 - a. Requisition Procedure.
 - b. Critical Items Delivery and Storage.
- 39. CLASS IX SUPPLY
 - a. Requisition Procedure.
 - b. Stock Levels.
 - c. Salvage.
 - d. Records.
- 40. CLASS X SUPPLY
 - a. Requisition Procedure.
 - b. Pickup Procedure.
- 41. MAINTENANCE OF VEHICLES AND EQUIPMENT
 - a. Organizational Maintenance.
 - b. Maintenance Officer's Responsibilities.
 - c. Forms Used.
 - d. Priorities.
- 42. EVACUATION OF VEHICLES AND EQUIPMENT
 - a. Division Support Command.
 - b. Maintenance Battalion.
- 43. EVACUATION AND HOSPITALIZATION—Annex K.

Section VII. COMMUNICATIONS

- 44. COMMUNICATION BETWEEN UNITS
 - a. Radio (FM 24-18). Annex L.
 - b. Wire (FM 24-20). Annex M.
 - c. Responsibility for Installation.
 - d. Visual (FM 21-60).
- 45. COMMUNICATION PROCEDURES
 - a. Division Communications.
 - b. Radiotelephone Voice Procedure (FM 24-18 and FM 24-20).
 - c. Citation of SOI and SSI of Higher Headquarters.
- 46. MAINTENANCE RESPONSIBILITIES OF COMMUNICATIONS OFFICER

GREEN
LTC

- Annex A—References (omitted)
 B—Reports (omitted)
 C—Security
 D—Reorganization for Combat
 E—CBR and Nuclear Warfare
 F—Employment of ADM (omitted) (See FM 5-26)
 G—Loading Plan (omitted)
 H—Motor Movement
 I—Rail Movement
 J—Basic Loads (omitted)
 K—Evacuation and Hospitalization (omitted)

L—Radio Communication Nets (omitted)
M—Wire Communication Nets (omitted)

OFFICIAL

/s/Black
Black
Adj

ANNEX C (SECURITY) TO SOP, ENGINEER BATTALION

1. GENERAL SECURITY
Policy and Responsibilities.
2. SECURITY DURING MOVEMENT
 - a. Air Guards.
 - b. Manning of Vehicular Weapons.
 - c. Camouflage During Halts.
 - d. Advance, Flank, and Rear Guards.
 - e. Action in Case of Attack.
 - (1) Air.
 - (2) Mechanized.
 - (3) Nuclear, biological, and chemical.
3. SECURITY IN ASSEMBLY AREA (FM 5-15, FM 5-20, FM 5-31 and FM 61-100).
 - a. Camouflage.
 - b. Mines and Booby Traps.
 - c. Placement of Weapons.
 - (1) Air attack.
 - (2) Mechanized.
 - (3) Nuclear, biological, and chemical.
 - d. Joint Security.
 - e. Security Plans.
 - f. Sentry Posts and Outposts.
4. REAR-AREA OBSERVATION
 - a. Formation of Rear-Area Observation Groups.
 - b. Selection of Rear-Area Observation Posts.
 - c. Twenty-Four-Hour Manning Posts.
 - d. Observation of Rear Areas When Required.
 - e. Communications for Observation Posts.
5. SECURITY OF WORKING PARTIES
 - a. Responsibility.
 - b. Camouflage of Equipment.
 - c. Combat Readiness.
6. SECURITY WARNING SIGNALS
 - a. Air Attack.
 - b. Airborne Attack.
 - c. Mechanized Attack.
 - d. Nuclear, Biological and Chemical Attack.
7. FIRE SAFETY AND FIREFIGHTING
 - a. Plan (general).
 - b. Fire Personnel and Duties.
 - c. Safety Rules (motor pools, kitchens, and so forth).
8. ALERT PLANS
 - a. Unit Plans.

b. Alert Roster.

ANNEX D (REORGANIZATION FOR COMBAT) TO SOP,
-----ENGINEER BATTALION

1. GENERAL

- a. Requirement.
- b. Prior Approval of the Battalion Commander.

2. DESIGNATION OF FORWARD ECHELON

- a. Personnel.
- b. Equipment.

3. DESIGNATION OF REAR ECHELON

- a. Personnel.
- b. Equipment.

4. SUPPLY

- a. Ammunition.
- b. Unit Trains.

5. COMMUNICATIONS

6. MEDICAL EVACUATION

7. STATEMENT OF EFFECT ON REGULAR MISSION

ANNEX E (CBR AND NUCLEAR WARFARE) TO SOP,
-----ENGINEER BATTALION

1. GENERAL

- a. Purpose.
- b. Subordinate Units to Issue SOP to Conform.

2. REFERENCES

- a. FM 21-40 (other pertinent doctrinal sources).
- b. Division Training Directive No.
- c. Orders, SOP and Annexes.

3. ORGANIZATION

- a. Command and Staff Structure.
- b. Specialists.

4. RESPONSIBILITIES

- a. Individual.
- b. Company Commanders.
 - (1) Plans.
 - (2) Proficiency of unit personnel.
 - (3) Safeguarding and processing of captured enemy CBR personnel and equipment.
 - (4) Unit CBR equipment.
 - (5) First-and second-echelon decontamination.
- c. Large-Scale Decontamination (see Engineer Annex, Div SOP No.).

5. DISPERSION

Guide to Minimum Distance Maintained Between Various Type Sections.

6. CBR ALARMS

- a. General Alarm. Attack Considered Imminent.
- b. Actual Attack.
- c. All Clear.

7. PROCEDURE IN CASE OF CBR OR NUCLEAR ATTACK
 - a. Action Prior to Attack.
 - b. Action During Attack.
 - (1) Protective equipment.
 - (2) Cover and movement.
 - (3) Resupply of protective equipment and material.
 - (4) Coordination between higher, lower, and adjacent units.
 - c. Action After Attack.
 - (1) All clear signal.
 - (2) Continuation of mission.
 - (3) Marking and reporting of contaminated areas.
 - (4) Decontamination.
8. PROTECTION
 - a. Individual.
 - b. Unit.
 - c. Tactical.
9. SUPPLY
 - a. Emergency Requisitions.
 - b. Authorized Levels of CBR Equipment.
10. TRAINING
See Division Training Directive No.

ANNEX H (MOTOR MOVEMENT) TO SOP,ENGINEER
BATTALION

1. GENERAL (Division SOP and march orders).
 - a. Preparation of Vehicles.
 - b. Motor Marches.
 - (1) Strip maps.
 - (2) Route reconnaissance.
 - (3) Messing and refueling.
 - (4) Night marches.
 - (5) Composition of march units and serials.
 - (6) Distances to be maintained.
 - (7) Speeds and rate of march.
 - (8) Posting of traffic guards during halts.
 - c. Conduct of Personnel During Movement.
 - d. Maintenance on Marches and Movement.
2. VEHICLE AND EQUIPMENT REGULATIONS
 - a. Motor Pool.
 - (1) Dispatch.
 - (2) Service.
 - (3) Maintenance.
 - b. Regulations for Administrative Vehicles.

ANNEX I (RAIL MOVEMENT) TO SOP,ENGINEER
BATTALION

1. ACTION BY S1
Troop Lists.
2. ACTION BY S2
 - a. Railroad Reconnaissance Report.
 - b. Security.

3. ACTION BY S3

- a.* Determine Rolling-Stock Requirements.
- b.* Coordinate Loading Plans.
- c.* Prepare Loading Schedule and Designate Areas.

4. ACTION BY S4

- a.* Initiate Transportation Requests.
- b.* Troop and Guard Mess.
- c.* Procurement of Blocking Materiel and Dunnage.
- d.* Prepare Shipping Documents.
- e.* Movement Policy.
- f.* Designation of Movement Control Personnel.



APPENDIX C

EXAMPLES OF ENGINEER ANNEXES TO A DIVISION OPERATION PLAN

EXAMPLE 1. ENGINEER ANNEX TO A DIVISION OPERATION PLAN

(Not a Copy of Any Known Plan)

Classification

(No change from oral orders except paragraph 1b(3))

Copy No. 5
4th Division
TOWNVILLE (XU2484)
AGGRESSORLAND
251500 Jul 19
MCR3

Annex D (Engineer) to Operation Plan STORM

References: Maps, AGGRESSORLAND, 1: 50,000, TOWNVILLE, FARMVILLE, DELTA, revised May 19... Task Organizations: Annex A, Task organization, to OPLAN STORM.

1. SITUATION

- a. Enemy forces. Annex B (Intelligence) to OPLAN STORM.
- b. Friendly forces.
 - (1) Annex C (Operations Overlay) to OPLAN STORM.
 - (2) Appendix 1 (Barrier Plan) to Annex C (Operations Overlay) to OPLAN STORM.
 - (3) Corps Arty furnishes AD protection to engineer equipment parks, bridge and ferry sites in zone.
 - (4) Corps engineer assumes responsibility for division engineer area and task assignments at effective time and date of execution of OPORD 13.
- c. Attachments and detachments.

121st Engr Bn (C) attached effective 260400 July 19—.
- d. Assumptions.
 - (1) Para 1d OPLAN STORM.
 - (2) Terrain will initially require utilization of AVLB
During Phase 2 stream crossings will require rafting and float bridge equipment.

2. MISSION

Organic and attached engineer units support operation by breaching obstacles and minefields, maintaining roads in zone, and constructing bridges over streams and dry gaps.

(Classification)

(Classification)

3. EXECUTION**a. Concept of operations.**

- (1) Paragraph 3a, OPLAN STORM.
- (2) Organic engineer units will provide support to committed brigades with priority of support to brigades. Organic Bn (—) and attached Engr Bn (C) will provide general support on area basis, prepared to provide direct support to brigade when committed.

b. 4th Engr Bn.

- (1) Attach one Engr Co reinforced with one platoon and one Sec AVLB of Bridge Co to brigade.
- (2) Attach one Engr Co reinforced with one Sec AVLB to brigade.
- (3) BN (—) :GS.
- (4) Be prepared to attach one Engr Co reinforced with heavy raft platoon of Bridge Co to brigade on order.
- (5) Be prepared to establish a minimum of three WSP east of NARROW River.

c. 121st Engr Bn (C).

- (1) Operate 3 WSP in zone.
- (2) Maintain Div MSR.
- (3) Be prepared to assist in construction of floating and/or fixed bridges on order.
- (4) Be prepared to conduct roadblocks east of DELTA (XY4188) on order.

d. Coordinating instructions.

- (1) WSP will be leapfrogged to insure continuous water supply.
- (2) Direct liaison authorized between 4th Div Engr and 1st and 2d Div Engr.
- (3) After opening bridges across NARROW River, maintain two rafts in operation at each bridge site for return traffic until 261800 July 19—.
- (4) This plan effective for planning on receipt, becomes OPORD 13 for execution on Div order.

4. SERVICE SUPPORT

- a. ADMINO 5** remains in effect, except paragraph 1b.
- b. App 1—Allocation of Engr Cl I, II, and IV, Equip and Sup.**
- c. Location of Engr Equip parks as follows:**
 - (1) No. 1—Vic HIGH RIDGE (VT2439).
 - (2) No. 2—LOW KNOB (ST2324).
 - (3) No. 3—FLAT LAND (TT2556).

5. COMMAND AND SIGNAL

- a. Annex H Communications-Electronics to OPLAN STORM; Index 9, SOL.**
- b. CP's.**
 - (1) 4th Engr Bn, TOWN (AB4087).
 - (2) Other CP's report location.

(Classification)

(Classification)

c. Axis of signal communications. TOWN (AB4087)—VILLAGE (EF6389)—CITY (IT7843).

Acknowledge.

FLEXO
Maj Gen

Appendixes: Appendix I—Allocation of Engr Cl I, II and IV Equip and Sup (omitted)

DISTRIBUTION: A

OFFICIAL:

/s/Price
PRICE

G3

EXAMPLE 2. BARRIER ANNEX TO A DIVISION OPERATION PLAN

(Not a Copy of Any Known Plan)

(Classification)

(No change from oral orders.)

Copy No. 3
4th Division
BOBS (RC4098)
AGGRESSORLAND
181945 Feb 19__
GCW 7

Annex F (Barrier Plan) to Operation Plan LANCE

References: Maps, AGGRESSORLAND, 1:100,000, ROTHEN, Edition 5; AGGRESSORLAND, 1:500,000, MERGEN, Edition 2. Task Organization: Annex A, Task Organization, to OPLAN LANCE.

1. SITUATION

- a. Enemy forces. Annex B (Intelligence) to OPLAN LANCE.
- b. Friendly forces.
 - (1) Paragraph 1b, OPLAN LANCE.
 - (2) 11th Engr Gp (C) supports 4th Div with one Float Bridge Company or order.
- c. Attachment and detachments.
 - 11th Engr Bn (C) attached effective 181945 Feb 19__.
- d. Assumptions.
 - (1) Paragraph 1d, OPLAN LANCE.
 - (2) Forward units will have a minimum of 24 hours to prepare barrier before receiving enemy pressure.

2. MISSION

Division, acting as corps covering force, executes barrier system and extends corps barrier in sector to disorganize, deceive, and delay the enemy in front of the GOP, and to force concentration of enemy forces in the valley of the UMP and WACH Rivers if RED River is crossed.

(Classification)

(Classification)

3. EXECUTION

a. Concept of operations.

(1) Paragraph 3a, OPLAN LANCE.

(2) Barrier system east of RED River designed to disorganize, deceive and delay the enemy; barrier system west of RED River designed to force concentration of enemy forces in the valleys of the UMP and WACH Rivers.

b. _____ Brigade.

Barrier	Priority	Target date for completion	Remarks
BAL River	1	191945	Demolish all bridges on BAL River; crater, demolish, and mine with both AT and APers mines the approaches through ridge MESSEL (EF4810)—BRON (GH5107).
E	1	191945	Crater and mine defile at ALT (H14598) with AT and APers mines.
FK	2	211800	Mine saddle from WEIGER (BL4000) to JUNG (BC4007) with AT mines only.
HL	3	211800	Mine ridge UTTING (EF4299) to RJ at EF425990 with AT mines only.

c. _____ Brigade.

Barrier	Priority	Target date for completion	Remarks
AB	1	200200	Mine entrance to UMP River Valley with both AT and APers mines; improve RED River banks to form effective obstacles; demolish bridges over RED River on Div order.
BD	2	210600	Prepare wire obstacles and mine ridge with AT mines; be prepared to reinforce with APers mines.
AE	3	211800	Mine UMP River Valley with both AT and APers mines.

d. _____ Brigade.

Barrier	Priority	Target date for completion	Remarks
BC	1	191945	Improve RED River banks to form effective obstacle and mine with both AT and APers mines; demolish all bridges over RED River on Div order.
DG	2	210600	Prepare wire obstacles and mine ridges D to G with AT mines only initially; be prepared to reinforce with APers mines.
GI	3	211800	Mine WACH Valley with both AT and APers mines.

(Classification)

(Classification)

e. 4th Engr Bn.

Barrier	Priority	Target date for completion	Remarks
JK	1	201945	Mine ridge with AT mines only initially; be prepared to reinforce with APers mines on order.
EJ	1	201945	Prepare for demolition all bridges over UMP River; mine with both AT and APers mines.
IM	2	211800	Prepare for demolition all bridges over WACH; mine with both AT and APers mines.

f. 11th Engr Bn (C).

Barrier	Priority	Target date for completion	Remarks
KLM	1	201945	Mine ridge with AT mines only initially; be prepared to reinforce with APers mines on order.
MP	2	211800	Prepare for demolition all bridges over WACH; mine with both AT and APers mines.

g. Coordinating instructions.

- (1) Brigades will prepare additional barriers forward of GOP which block high speed avenues of approach and lateral barriers between adjacent brigades.
- (2) Brigades coordinate extent of and location of lanes and gaps with adjacent corps. Direct liaison is authorized.
- (3) Provisions will be made to cover barriers with heavy weapons fire; smallarms fire coverage wherever possible.
- (4) Gaps and lanes in minefields will remain open until ordered closed by Div Hq or until threat of capture by the enemy.
- (5) Demolitions, including bridges and cratering of routes, executed only on order Div Hq or on brigade order if threat of capture by the enemy is imminent.
- (6) Appendix 1, Barrier Overlay.
- (7) Appendix 2, Minefield Location Plan.
- (8) Appendix 3, Obstacles and Demolitions Plan.
- (9) This barrier plan not taken forward of brigade CP.
- (10) This plan effective for planning or receipt becomes OPORD 25 on Div order.

4. SERVICE SUPPORT

- a. ADMINO 18 continues in effect except paragraph 1b.
- b. AT and APers mines, demolitions, and napalm available ASP 182100 Feb 19__.
- c. Minefields marking materials, wire, and fortifications materials available Sup Pt 182100 Feb 19__.

(Classification)

(Classification)

d. Appendix 4, Allotment of Cl, I, IV, and V equipment & supplies.

5. COMMAND AND SIGNAL

a. Index 3, SOI. Annex D, Communications-Electronics.

b. Reports.

- (1) Minefields. Report intended location, extent, estimated time of completion, type and density of mines; follow with standard minefield laying report including sketches.
- (2) Other obstacles and demolitions. Report location, type, extent, and estimated time of completion.

Acknowledge.

FLEXO
Maj Gen

Appendixes: 1—Barrier Overlay (omitted)
2—Minefield Location Plan (omitted)
3—Obstacles and Demolitions Plan (omitted)
4—Allotment of Cl, I, IV, and V Equipment and Supply
(omitted)

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APPENDIX D

ORDERS TO THE DEMOLITION GUARD COMMANDER AND TO THE DEMOLITION FIRING PARTY

1. Three commanders normally are concerned with the execution of a demolition—

a. The military authority who has overall responsibility, i.e. the officer empowered to order the firing of the demolition (referred to hereafter as "the authorized commander").

b. The commander of the demolition guard.

c. The commander of the demolition firing party.

2. Each authorized commander will—

a. Determine the requirement and allot responsibility for a demolition guard.

b. Establish a clear cut channel from himself to the commander of the demolition guard for transmission of the order to fire the demolition.

c. Insure that this channel is known and understood by all concerned.

d. Insure a positive, secure means for transmitting the order to fire.

e. Specify whether the demolition guard commander is authorized to order the firing of the demolition on his own initiative if the enemy is in the act of capturing it.

3. Where a demolition is to be prepared which is important to the operational plan, the authorized commander normally will appoint a demolition guard, the commander of which will be responsible for—

a. Insuring, if so ordered, that the demolition is not captured intact by the enemy, and,

b. Giving to the demolition firing party commander the orders for changing the state of readiness of the demolition and the firing orders.

4. The following suggested format will be used for the orders to the commander of a demolition guard and DA Form 2050-R will be used for the orders to the commander of a demolition firing party whenever time and conditions permit. After all parts of this format and form have been completed by the appropriate authority they will be issued to the commanders of the demolition guard and the demolition firing party and will be retained by them until the demolition has been completed.

5. The contents and paragraph numbers of the format issued by each authority will conform exactly to the following examples. DA Form 2050-R (Orders to the Commander, Demolition Firing Party) will be reproduced locally on 8- by 10½-inch paper (image size, 7" x 9 4/6").

6. To facilitate the use of the format and form, it is recommended that general instructions be included in appropriate unit standing operating procedures.

Serial No. Security Classification

ORDERS TO THE DEMOLITION GUARD COMMANDER

- NOTES. 1. This format will be completed and signed before it is handed to the commander of the demolition guard.
2. In completing the format, all spaces must either be filled in or lined out.
3. The officer empowered to order the firing of the demolition is referred to throughout as the "authorized commander."

From To

PART I—PRELIMINARY INSTRUCTIONS

1.
 - a. Description of target
 - b. Location:
 - Map Name and Scale
 - Sheet No.
 - Grid Reference
 - c. Codeword or codesign (if any) of demolition target
2. The authorized commander is

 (give appointment only). If this officer should delegate this authority, you will be notified by one of the methods shown in paragraph 4, below.
3. The Demolition Firing Party has been/will be provided by

4. All messages, including any codewords or codesign (if any) used in these orders will be passed to you by—
 - a. Normal command wireless net, or
 - b. Special liaison officer with communications direct to the authorized commander, or
 - c. Telephone by the authorized commander, or
 - d. The authorized commander personally, or
 - e.

(Delete those NOT applicable)

NOTE: All orders sent by message will be prefixed by the codeword or codesign (if any) at paragraph 1c, and all such messages must be acknowledged.

PART II—CHANGING STATES OF READINESS

5. The demolition will be prepared initially to the State of Readiness
 by hours on (date).
6. On arrival at the demolition site, you will ascertain from the commander of the demolition firing party the estimated time required to change from State "1" (SAFE) to State "2" (ARMED). You will insure that this information is passed to the authorized commander and is acknowledged.
7. Changes in the State of Readiness from State "1" (SAFE) to State "2" (ARMED) or from State "2" to State "1," will be made only when so ordered by the authorized commander. However, the demolition may be ARMED in order to accomplish emergency firing when you are authorized to fire it on your own initiative.

8. A record of the changes in the State of Readiness will be entered by you in the table below, and on the firing orders in possession of the commander of the demolition firing party.

State of Readiness order "1" (SAFE) or "2" (ARMED)	Time and date change to be completed	Authority	Time and date of receipt of order

NOTE: If the order is transmitted by an officer in person, his signature and designation will be obtained in the column headed "Authority."

9. You will report completion of all changes in the State of Readiness to the authorized commander by the quickest means.

PART III—ORDERS FOR FIRING THE DEMOLITION

10. The order for firing the demolition will be passed to you by the authorized commander.

11. On receipt of this order you will immediately pass it to the commander of the demolition firing party on his demolition orders form (DA Form 2050-R, Orders to the Commander of the Demolition Firing Party).

12. After the demolition has been fired you will report the results immediately to the authorized commander.

13. In the event of a misfire or only partially successful demolition you will give the firing party protection until such time as it has completed the demolition and report again after it has been completed.

PART IV—EMERGENCY FIRING ORDERS

NOTES. 1. One subparagraph of paragraph 14 must be deleted.

2. The order given herein can only be altered by the issue of a new form, or, in emergency by the appropriate order (or code-word if used) in Part V.

14. a. You will order the firing of the demolition only upon the order of the authorized commander.

OR

b. If the enemy is in the act of capturing the target you will order the firing of the demolition on your own initiative.

PART V—CODEWORDS (IF USED)

Action to be taken	Codeword (if used)
a. Change State of Readiness from "1" to "2" (see para 7)	
b. Change State of Readiness from "2" to "1" (see para 7)	
c. Fire the demolition (see para 10)	
d. Paragraph 14a is now cancelled. You are now authorized to fire the demolition if the enemy is in the act of capturing it.	

PART V—CODEWORDS (IF USED) (Continued)

Action to be taken	Codeword (if used)
e. Paragraph 14b is now cancelled. You will order the firing of the demolition only upon the order of the authorized commander.	
f. Special authentication instructions, if any.	

PART VI

Signature of officer issuing these orders

Name (printed in capital letters)

Rank Appointment

Time of issue hours, (date).

PART VII—DUTIES OF THE COMMANDER OF THE
DEMOLITION GUARD

15. You are responsible for—
 - a. Command of the demolition guard and the demolition firing party.
 - b. The safety of the demolition from enemy attack of sabotage.
 - c. Control of traffic and refugees.
 - d. Giving the orders to the demolition firing party in writing to change the state of readiness.
 - e. Giving the order to the demolition firing party in writing to fire the demolition.
 - f. After the demolition, reporting on its effectiveness to the authorized commander.
 - g. Keeping the authorized commander informed of the operational situation at the demolition site.
16. You will acquaint yourself with the orders issued to the commander of the demolition firing party and with the instructions given by him.
17. The demolition guard will be so dispersed as to insure at all times complete all-around protection of the demolition against all types of attack or threat.
18. The commander of the demolition firing party is in technical control of the demolition. You will agree with him on the site of your HQ and the firing point. These should be together whenever practicable. When siting them you must give weight to the technical requirements of being able to view the demolition and have good access to it from the firing point.
19. You will nominate your deputy forthwith and compile a seniority roster. You will insure that each man knows his place in the roster, understands his duties and knows where to find this form if you become a casualty or are unavoidably absent. The seniority roster must be made known to the commander of the demolition firing party.
20. Once the state of readiness "2" (ARMED) has been ordered, either you or your deputy must always be at your HQ so that orders can be passed on immediately to the commander of the demolition firing party.

SECURITY CLASSIFICATION

ORDERS TO THE COMMANDER, DEMOLITION FIRING PARTY		SERIAL NUMBER	
NOTE: Parts I, II and III will be completed and signed before this form is handed to the commander of the Demolition Firing Party. Paragraphs 4 and 5 can only be altered by the authority issuing these orders. In such cases a new form will be issued and the old one destroyed.			
FROM:		TO:	
PART I - ORDERS FOR PREPARING AND CHARGING THE DEMOLITION TARGET			
1a. DESCRIPTION			
b. LOCATION		c. CODE WORD OF DEMOLITION TARGET (If any)	
MAP NAME AND SCALE	SHEET NO.	GRID REFERENCE	
d. ATTACHED PHOTOGRAPHS AND SPECIAL TECHNICAL INSTRUCTIONS			
2. THE DEMOLITION GUARD IS BEING PROVIDED BY (Unit)			
3. YOU WILL PREPARE AND CHANGE THE DEMOLITION TARGET TO THE STATE OF READINESS			
BY _____ HOURS ON (Date) _____.			
ANY CHANGES MAY BE MADE ONLY ON THE ORDER OF THE ISSUING AUTHORITY, OR BY THE OFFICER DESIGNATED IN PARAGRAPH 4d AND WILL BE RECORDED BELOW.			
STATE OF READINESS ORDERED "1"(SAFE) or "2"(ARMED)	TIME AND DATE CHANGE TO BE COMPLETED	AUTHORITY	TIME AND DATE OF RECEIPT OF ORDER
NOTE: All orders received by message will be verified by the code word at Paragraph 1c. If the order is transmitted by an officer in person, his signature and designation will be obtained in the Column headed "Authority".			
PART II - ORDERS FOR FIRING			
NOTE: The officer issuing these orders will strike out the subparagraphs of Paragraphs 4 and 5 which are not applicable. When there is a demolition guard, Paragraph 4 will always be used and Paragraph 5 will always be struck out.			
4a. YOU WILL FIRE THE DEMOLITION AS SOON AS YOU HAVE PREPARED IT.			
b. YOU WILL FIRE THE DEMOLITION AT _____ HOURS ON (Date) _____.			
c. YOU WILL FIRE THE DEMOLITION ON RECEIPT OF THE CODE WORD _____.			
d. YOU WILL FIRE THE DEMOLITION WHEN THE OFFICER WHOSE DESIGNATION IS _____ HAS SIGNED PARAGRAPH 8 BELOW.			
5. EMERGENCY FIRING ORDERS (ONLY applicable when there is NO demolition guard)			
a. YOU WILL NOT FIRE THE DEMOLITION IN ANY CIRCUMSTANCES EXCEPT AS ORDERED IN PARAGRAPH 4 ABOVE.			
b. YOU WILL FIRE THE DEMOLITION ON YOUR OWN INITIATIVE IF THE ENEMY IS IN THE ACT OF CAPTURING IT.			

DA FORM 2050-R, 1 NOV 57

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(Paper size, 8" x 10½", image size, 7" x 9-4/6")

Figure D-1. DA Form 2050-R, Orders to the Commander, Demolition Firing Party (front).

SECURITY CLASSIFICATION

PART III - ORDERS FOR REPORTING			
6. AFTER FIRING THE DEMOLITION YOU WILL IMMEDIATELY REPORT RESULTS TO THE OFFICER WHO ORDERED YOU TO FIRE. IN THE EVENT OF A PARTIAL FAILURE YOU WILL WARN HIM, AND IMMEDIATELY CARRY OUT THE WORK NECESSARY TO COMPLETE THE DEMOLITION			
7. FINALLY, YOU WILL IMMEDIATELY REPORT THE RESULTS TO YOUR UNIT COMMANDING OFFICER (See Paragraph 13.)			
SIGNATURE OF OFFICER ISSUING THESE ORDERS	NAME (In capitals)	TIME OF ISSUE	DATE OF ISSUE
	DESIGNATION		
PART IV - ORDER TO FIRE			
8. BEING EMPOWERED TO DO SO, I ORDER YOU TO FIRE NOW THE DEMOLITION DESCRIBED IN PARAGRAPH 1.			
SIGNATURE	NAME (In capitals)	TIME	DATE
	DESIGNATION		
PART V - GENERAL INSTRUCTIONS (Read These Instructions Carefully)			
9. YOU ARE IN TECHNICAL CHARGE OF THE PREPARATION, CHARGING AND FIRING OF THE DEMOLITION TARGET DESCRIBED. YOU WILL NOMINATE YOUR DEPUTY FORTHWITH AND COMPILE A SENIORITY ROSTER OF YOUR PARTY. YOU WILL INSURE THAT EACH MAN KNOWS HIS PLACE IN THE ROSTER, UNDERSTANDS THESE INSTRUCTIONS, AND KNOWS WHERE TO FIND THIS FORM IF YOU ARE HIT OR UNAVOIDABLY ABSENT. YOU WILL CONSULT WITH THE COMMANDER OF THE DEMOLITION GUARD ON THE SITING OF THE FIRING POINT. 10. YOU MUST UNDERSTAND THAT THE COMMANDER OF THE DEMOLITION GUARD (where there is one) IS RESPONSIBLE FOR: a. OPERATIONAL COMMAND OF ALL THE TROOPS AT THE DEMOLITION SITE. (You are therefore under his command.) b. PREVENTING THE CAPTURE OF THE DEMOLITION SITE, OR INTERFERENCE BY THE ENEMY WITH DEMOLITION PREPARATIONS. c. CONTROLLING ALL TRAFFIC AND REFUGEES. d. GIVING YOU THE ORDER TO CHANGE THE STATE OF READINESS FROM "1 (SAFE)" TO "2 (ARMED)" OR BACK TO "1 (SAFE)" AGAIN. YOU WILL INFORM HIM OF THE TIME REQUIRED FOR SUCH A CHANGE. e. PASSING TO YOU THE ACTUAL ORDER TO FIRE. 11. WHEN THERE IS NO DEMOLITION GUARD AND YOU ARE INSTRUCTED IN PARAGRAPH 4 TO ACCEPT THE ORDER TO FIRE FROM SOME PARTICULAR OFFICER, IT IS IMPORTANT THAT YOU ARE ABLE TO IDENTIFY HIM. 12. IF YOU GET ORDERS TO FIRE, OTHER THAN THOSE LAID DOWN IN PARAGRAPH 4, YOU SHOULD REFER THEM TO THE DEMOLITION GUARD COMMANDER OR, IF THERE IS NO DEMOLITION GUARD COMMANDER, TO YOUR IMMEDIATE SUPERIOR. IF YOU CANNOT DO THIS, YOU WILL ONLY DEPART FROM YOUR WRITTEN INSTRUCTIONS WHEN YOU ARE SATISFIED AS TO THE IDENTITY AND OVER-RIDING AUTHORITY OF WHOEVER GIVES YOU THESE NEW ORDERS, AND YOU WILL GET HIS SIGNATURE IN PARAGRAPH 8 WHENEVER POSSIBLE. 13. THE REPORT TO YOUR UNIT COMMANDING OFFICER, AS CALLED FOR IN PARAGRAPH 7, SHOULD CONTAIN THE FOLLOWING INFORMATION (where applicable): a. IDENTIFICATION REFERENCE OF DEMOLITION. b. MAP REFERENCE. c. TIME AND DATE WHEN DEMOLITION WAS FIRED. d. EXTENT OF DAMAGE ACCOMPLISHED, INCLUDING: - ESTIMATED WIDTH OF GAP - NUMBER OF SPANS DOWN - SIZE AND LOCATION OF CRATERS IN A ROAD OR RUNWAY. - MINES LAID. e. SKETCH SHOWING EFFECT OF DEMOLITION.			

SECURITY CLASSIFICATION

Figure D-2. DA Form 2050-R, Orders to the Commander, Demolition Firing Party. (reverse).

APPENDIX E
MINIMUM POTABILITY STANDARDS FOR FIELD WATER SUPPLY

SOLOG AGREEMENT 125

UNITED STATES—UNITED KINGDOM—CANADIAN—
AUSTRALIAN ARMIES

NON-MATERIEL STANDARDIZATION PROGRAM

TITLE OF AGREEMENT

MINIMUM POTABILITY STANDARDS

FOR FIELD WATER SUPPLY

DETAILS OF AGREEMENT

1. The Armies of the United States, United Kingdom, Canada, and Australia agree to accept the criteria and standards set forth herein as the minimum potability standards for a safe emergency water supply intended for human consumption under field conditions.
2. Criteria
 - a. Short term field water consumption is consumption for 0-7 days.
 - b. Long term field water consumption is consumption for periods in excess of seven days.
 - c. Total daily consumption per man is considered to be 5 liters (approx 1 imperial gallon or 5 US quarts). Under environmental conditions where water consumption substantially exceeds 5 liters per day, the tolerance levels should be proportionately reduced by the commander upon recommendation of his surgeon.
 - d. At the individual level the only standards that can be applied are the bacteriological standard and the short term physical standard.
 - e. At the unit level short term standards only can be applied.
 - f. At Brigade, Combat Group or equivalent and rearward levels the short term standards apply for 0-7 days. Beyond this time frame, the long term standards apply.
 - g. Where one of the Armies is unable to meet the standards prescribed herein, the other Armies participating in the agreement will be notified.
3. Source

The water supply shall be obtained from the best available source and shall be rendered safe by acceptable treatment methods.
4. Bacteriological Standards
 - a. Coliform Count

The most probable number of the coliform group of bacteria shall be less than 1.0 per 100 ml of water. (Short and long term)
 - b. Analysis

The method and analysis for coliform bacteria shall be that customary for the cognizant nation.

c. Pollution

The presence of the coliform bacteria, including all organisms of the Coli-Aerogenes group, shall be considered as indicating water pollution, other than biological Agents.

5. Physical Standards

a. Turbidity

For short term consumption water shall be reasonably clear.

For long term consumption, the turbidity of water shall not exceed 5.0 mgms per liter (silica scale).

b. Taste and Odor

For short term consumption, water should be reasonably free from taste or odor due to hydrogen sulphide, phenols, or other chemical substances.

For long term consumption, water should be free from taste or odor due to such substances both before and after disinfection.

6. Chemical Standards

The methods of analysis for the following substances shall be as specified by cognizant nation.

a. Substance for which water must be analyzed as a routine requirement.

(1) Short Term Standards

The maximum limits listed below are mandatory for emergency water supply for a period not exceeding seven days. (Asterisked standards are interim pending completion of more exacting studies.)

Arsenic (As)	2.0	mgm/1
Cyanides (incl Cyanogen Chloride)	20.0	mgm/1
Mustard (Sulphur & Nitrogen)	2.0	mgm/1*
Nerve Agent (GA)	0.1	mgm/1*
(GB)	0.05	mgm/1*
(VX)	0.005	mgm/1*

(2) Long Term Standards

The limits listed below are preferable in water to be used continuously in excess of seven days. (Asterisked standards are interim pending completion of more exacting studies.)

Arsenic	0.2	mgm/1
Cyanides (incl Cyanogen Chloride)	2.0	mgm/1
Mustard (Sulphur & Nitrogen)	2.0	mgm/1*
Nerve Agent (GA)	0.1	mgm/1*
(GB)	0.05	mgm/1*
(VX)	0.005	mgm/1*
Chloride (Cl)	600.0	or mgm/1
Magnesium (Mg)	150.0	mgm/1
Sulphates (SO ₄)	400.0	mgm/1
Color	50	units
Total Solids	1500.0	mgm/1

7. Radiological Standards (Gross Fission Products)

a. For short term consumption, no absolute numerical standard is recommended or considered necessary. This is based on the conclusion that, if the external radiation hazard permits occupancy of the water point, the water is suitable for consumption during occupancy not exceeding the one-week period.

b. For long term consumption, available information does not permit the establishment of a practical standard.

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By Order of the Secretary of the Army:

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

W. C. WESTMORELAND,
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